# FOOD MANUFACTURE

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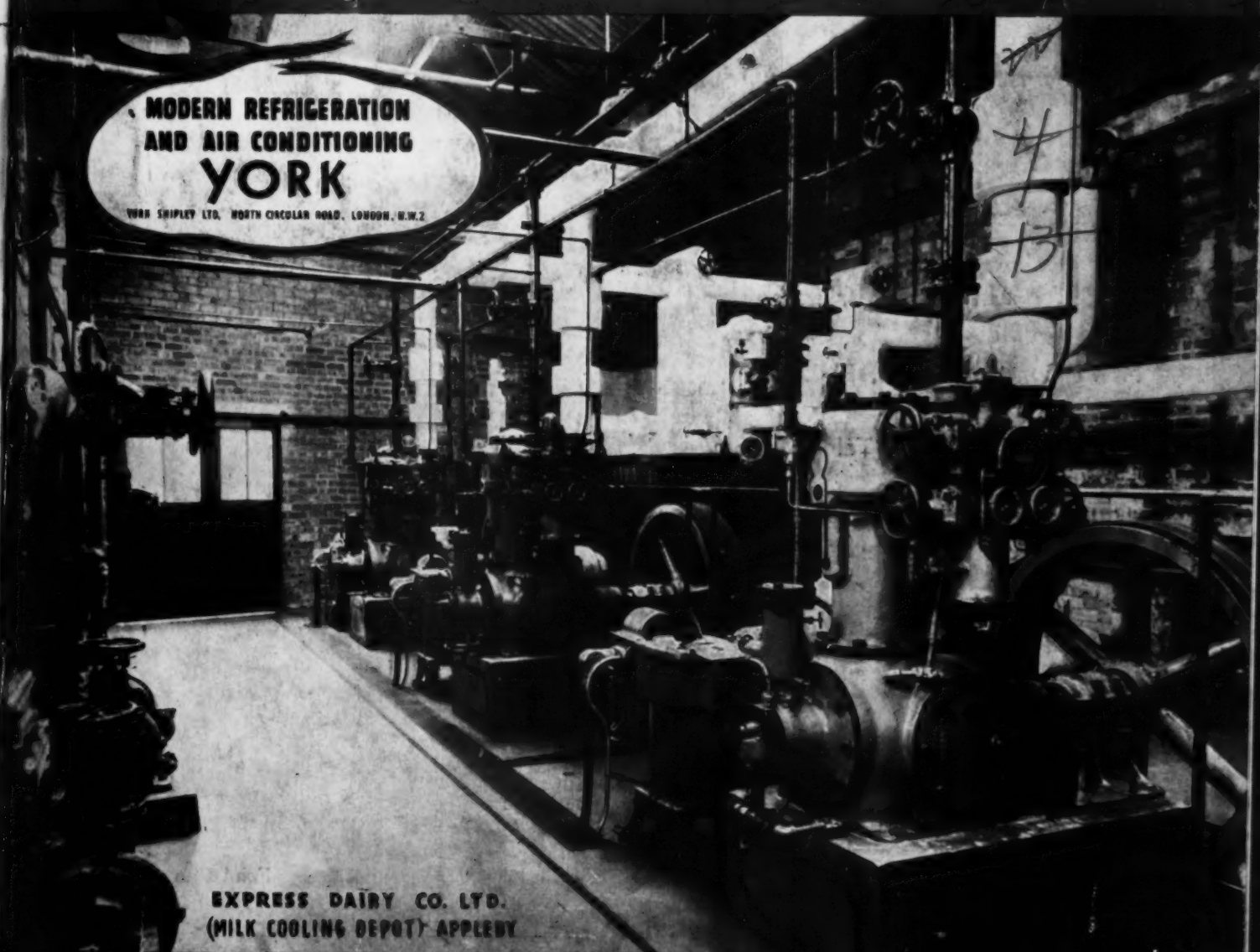

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# FOOD MANUFACTURE

Incorporating Canning, Packing and Preserving.

**Volume . . . XI**
**Number . . . 6**

JUNE . . . . 1936

**Colours and Flavours Number**

SUBSCRIPTION

Single Copies - 1/-
Annual Subscription
12 Issues - - 10/-

Published on the first day of the Month
by
LEONARD HILL LIMITED
17, Stratford Place, London, W.1
Telephone: Mayfair 7383
(Private Branch Exchange).

The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

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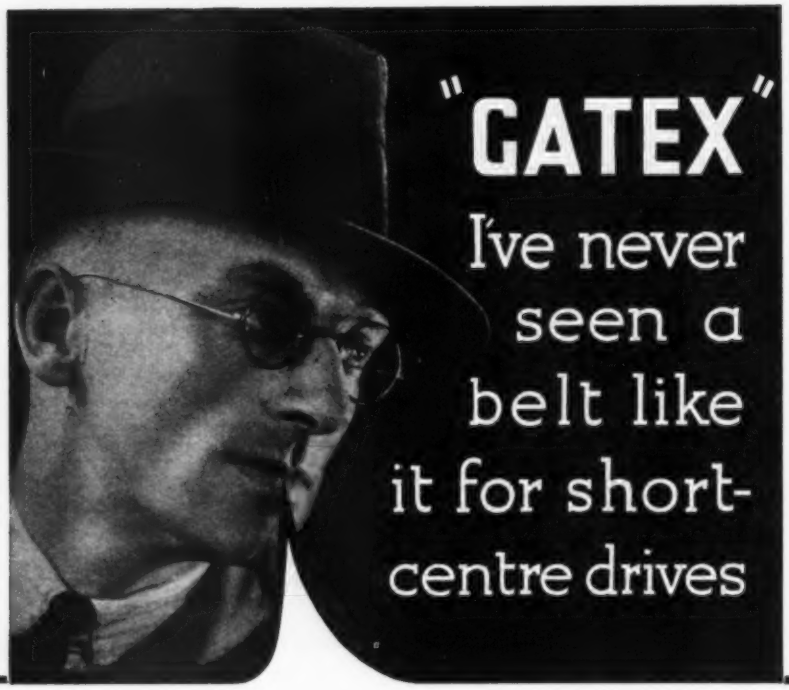
MANAGING EDITOR: G. W. Lacey, B.Sc., A.I.C.



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FOOD MANUFACTURE

Vol. XI, No. 6 June, 1936

## Colours and Flavours

COLOUR AND flavour in foodstuffs are more closely related than would at first appear, though they appeal to totally different senses. In a paper read early this year before a joint meeting of the Food Group of the Society of Chemical Industry and the Scientific Section of the Society of Public Analysts, H. C. Moir said "Many people find that their sense of taste is affected by the colour of the foodstuff to be tasted. They may give a totally wrong answer where delicate flavours are concerned, as a result of being misled by their eyes". In one of a series of tests which Mr. Moir carried out, table jellies of good, true-to-type flavours, whose colours were not necessarily those associated with their flavours, were wrongly identified as to flavour in quite an extraordinary fashion. For example, a lemon-flavoured jelly was stated to be greengage, cherry, strawberry, raspberry, pine-apple, and as many more dissimilarly flavoured fruits. Mr. Moir reached the conclusion that there is a wide disparity in discriminating ability between individuals, and that there is an ignorance of their disability which obscures the issue in most people who cannot discriminate. Though it may be objected, he said, that, since a large proportion of the consuming public has no ability of this kind, the obsession with flavour is unwarranted; a discriminating section of the public exercises, nevertheless, an influence out of all proportion to that of the non-discriminating section.

The connection between colour and flavour is, of course, psychological, and is influenced by the state of health and appetite of the individual and by visual associations which are trusted very much more than associations of flavour. Thus, colour and flavour, to which can be added odour as an extension of flavour, very largely determine the appetising appeal of foods, and for that primary reason the colouring and flavouring of foodstuffs should be carefully studied by manufacturers. Indeed, there is a very wide and interesting field here for research parallel with the increasing interest in nutrition and dietetics. Colours can be tested, matched and checked by direct physical means, whereas the study of flavours calls for a sense like that of the skilled perfumer, who, although he does not taste the product, has developed the even more atrophied sense of smell until he is often able to detect one aromatic body associated in the same product with many other closely related aromatic substances. Both colour and flavour may be inherent in the product, or they may be artificially added in the form of natural or synthetic products made for the purpose. The development of distinctive flavour in a foodstuff to which it is natural necessitates constant care if its distinctiveness is not to be altered by any variation in the process of manufacture. For the same reasons the food manufacturer must obtain colouring and flavouring materials which are resistant to change under the influence of heat, acids, alkalies, preservatives, or any special conditions arising during manufacture. He must also effect their incorporation in the product with as complete a dispersion throughout the foodstuff as can possibly be achieved by physical means. Only in this way will the full value of the added colours and flavours be realised and make therefore their maximum appeal to the consumer. This number, which contains special contributions on various aspects of the colouring and flavouring of foodstuffs, should be helpful to manufacturers in maintaining and improving the quality of products in this respect.

## King Edward and Industry

As Mr. Hector Bolitho says in his foreword to *The Path of the King*, just published by the *News of the World*, King Edward VIII. is not the first of our sovereigns to encourage trade between Great Britain and other countries. But more than any other monarch has he been able, whilst Prince of Wales, to take an interest in British industry. This book is a pictorial record of many of his contacts with industry, and the lives of the industrial workers as well, from 1923 up to his accession to

the throne. It is handsomely produced, and the fine illustrations in photogravure are accompanied by many appropriate quotations from His Majesty's speeches. Mr. A. Wardle-Robinson, who is responsible for the production of the book, is to be congratulated on the choice of subjects which cover a wide range of His Majesty's industrial contacts, though the few illustrations showing King Edward interested in foodstuffs are only remotely connected with food manufacture. Can it be that the food industries have been slow to invite his interest in a vitally important industrial group? If so, then we would suggest that an early opportunity should be sought by those prominently concerned in the different branches of food production and manufacture to secure royal recognition at an appropriate time. After all, the food industries form one of the largest, if not the most important, industrial group directly concerned in the well-being of the people of this country.

## Food and War

We make no apology for entering the lists for the third time in succession. Before this vital problem is tackled in a proper scientific fashion and is no longer a political question about which evasive answers can be given, it will be necessary to stress without restraint the urgency of the situation. Very much more has been said and written since last month. The heap of cuttings that rises before us is mountainous. The Minister for the Co-ordination of Defence, in announcing that a sub-committee had been formed to make the necessary arrangements for the food supply of the civil population in time of war, said that he had every reason to believe that every firm and concern interested in the storage of food in its various forms would co-operate with the committee in supplying information and devising proper plans. There must be no question about that. Sir William Beveridge, who is Principal of the London School of Economics, has accepted the Chairmanship of the sub-committee. Sir William Beveridge is an economist. We therefore hope that prominent scientific men connected with food production and manufacture will be asked to serve on the committee. The Food Group of the Society of Chemical Industry should be represented. Lord Lloyd has deplored the decline of the merchant navy. He points out that there are now only about 2,000 British cargo carriers as compared with 3,000 when the submarine campaign began during the war. This situation alone calls for increased storage in the country. It must not be forgotten that for food manufacturers to remain in commercial existence during a period of war they must be able to secure an adequate supply of raw materials. In a letter addressed to us, Dr. A. A. Horvath, of the University of Delaware, Agriculture Experimental Station, U.S.A., suggests that soya beans should be added to the list of supplies to be stored since they contain 40 per cent. of high-grade protein and 20 per cent. of oil, they can be stored for years without deterioration and, furthermore, whole soya flour contains vitamins A, D, E, $B_1$ and $B_2$, as well as up to 3 per cent. of phosphatides. Self-sufficiency through agriculture still finds plenty of unenlightened protagonists, but, though the *British Medical Journal* has joined issue on this side, it is naturally more concerned with proper nutritional values and rightly advocates the storage of those foodstuffs which will provide a well-balanced ration. Fortunately the value of increasing the number of livestock in the country instead of increasing wheat and sugar-beet growing is being appreciated.

## Wheat Reserves

We have studied the paper given by Sir Herbert Matthews at the Royal Society of Arts on April 29 on "The Problem of Wheat Supply in Time of War" with great interest. In view of our own campaign on the problems of reserves of food during war time started by Mr. Fairbrother's article, "Are we Prepared?" in our April issue, this lecture was of considerable interest to us. We were glad to note the emphasis Sir Herbert placed on our absolute unpreparedness in 1914, and the fact that we seemed bent on refusing to learn the lesson that experience should have taught us. While our campaign has embraced the problem of reserves of food of all kinds in sufficient quantity to maintain a balanced diet, Sir Herbert Matthews concentrated entirely on wheat. Like us, he advocated an increase in the quantity of wheat in this country. His plea was for a six months' supply in silos and a further six months' supply in stack. We would go much further and have two years' supply at least. Sir Herbert pleads for an increased cultivation of English wheat. With that we do not agree. We have always held that this country is not suited climatically for satisfactory wheat cultivation, and in any case could never be self-supporting. We do not believe that increased production of wheat or sugar in this country would help at all. These two commodities can be imported to any desired extent and, if proper conditions are provided, can be stored for several years without deterioration. If a sufficient reserve has not been built up in the country the next important factor is that of tonnage for im-

porting food. The Government's policy has been to subsidise wheat and sugar which, as Sir Daniel Hall has pointed out, are the most concentrated of foods, bulk least in the holds, and can be obtained from our nearest colonies. Our policy is clear and definite. We will not be party to the frittering away of public money for the subsidising of unprofitable crops that can be obtained plentifully abroad and stored safely at home. Our home agriculture should be turned to the production of the health foods for which our climate and soil are eminently suited, such as milk, animal products, fruit, and vegetables. To our mind, therefore, in order to prepare for any war-time emergencies, the Government should first of all go into the question of adequate storage places for wheat and sugar and then get supplies. They should next encourage farmers to produce more of those perishable foods that cannot be obtained satisfactorily from abroad. They should stimulate research on the provision of vitamins and other accessory factors and take steps towards the manufacture of these. By so doing the Government would be providing a safe reserve of suitable food of a balanced character to maintain the people in time of war. At the same time they would be encouraging our farmers to be of the greatest benefit to the community.

## Cost of Living Index

One frequently comes across arguments in nutritional economics that are based on that highly problematic figure called the Cost of Living Index, and from one's own experiences the accuracy of this figure is questionable. We are pleased to see that it is to be revised. Recently the Minister of Labour stated in the House of Commons that he had decided that a revision of the basis of the cost of living index number should now be undertaken. It will now be necessary to collect data concerning the present distribution of the main items of expenditure of working-class households. This is a big undertaking and must provide representative information covering different seasons of the year, and will not be completed before the end of next year. Till then the cost of living index number will continue to be calculated on the existing basis, but the Minister hopes that the new index number will be able to be linked on to the previous numbers in such a way as to continue the series without a break. The investigation will be carried out by a small advisory committee which will include representatives of employers and trade unions. There can be no doubt that the present index number is far from satisfactory. Its method of compilation has been explained in a pamphlet issued by the Ministry of Labour in 1934, and doubtless with this as a basis and several years' experience of discrepancies to guide the committee, a more satisfactory method will be reached.

## The Three Names of Milk

In our issue for March we had an Editorial Comment on "The Four Names of Milk" to come into force on April 1. The Minister of Health has evidently thought better of it, as these have now been reduced to three, which will come into operation on June 1. It is interesting to compare our present grades with what we shall have in future. The present grades are "Certified," "Grade 'A' (Tuberculin Tested)", "Grade 'A' (Pasteurised)". The new ones are to be "Tuberculin Tested", "Accredited", and "Pasteurised". This new Order meets most of the objections raised by producers, especially that in regard to the suggested grade "Certified (Pasteurised)", which is the one of the four proposed for April 1 to be eliminated. Tuberculin Tested will replace the existing designations "Certified" and "Grade 'A' (Tuberculin Tested)". Tuberculin Tested Milk may, if desired, be pasteurised subject to the conditions of the Order, and where this is done it must be sold as "Tuberculin Tested Milk (Pasteurised)". When the new grade of "Tuberculin Tested" milk is bottled on the farm the Order will permit it to be described as "Tuberculin Tested Milk (Certified)". Accredited milk will replace the present "Grade 'A'" milk and be subject broadly to the same conditions. In order that existing stocks may be used up and necessary loss avoided, bottle caps and labels complying with the existing Order will be allowed until December 31, but apart from this it will not be permissible after May 31 to sell milk under any of the designations which the new Order abolishes.

## Better Quality Bread

The millers and bakers in France are either following in our footsteps or preceding us, for our Paris Correspondent informs us that a propaganda committee for the improvement of the quality of bread has been organised under the auspices of the General Agricultural Federation. It is felt, we are informed, that the quality of bread produced is not up to the level of that obtainable some years ago, and that this, to some extent at any rate, is the cause of the drop in consumption. The present consumption of bread in France is estimated at 120 kilogrammes (250 pounds) per person per

annum, which is less than half of the consumption before the war. The committee proposes to engage in the advertising of better bread. As we have said before, better and better bread should be the aim, when the advertising of it will have the desired effect.

## Agriculture in Russia

There can be no doubt that before very long Soviet Russia will become an important factor in world economics. So far she has been reconstructing and rebuilding, whether wisely or not, time will show. As a potential factor in world trade, the progress made in Russia should be followed most carefully. According to a recent review of Agricultural Progress in Russia, there was a general advance in agriculture last year, not only in grain cultivation but also in technical plants, such as cotton, sugar beet, flax, hemp, tobacco, tea, oil-seeds, and so on. In contrast to 1934, when only the grain crop registered a significant progress, the year 1935 saw a 30 per cent. increase in the harvest of the four principal technical plants—cotton, flax, sugar beet, and tobacco—and in one year the production of these plants was increased as much as in the four years 1928-32. In addition, the grain harvest was increased largely by the better use of harvester combines, which led to lower threshing losses. Improved methods of farming also played some part, and the employment of the principle of fallowing has undoubtedly improved the yields of spring wheat. The area of wheat land outside the black earth belt has been increased from 1,857,000 acres in 1932 to 6,027,000 acres last year. A special feature of Russian agriculture has been the speed of collectivisation. To-day 90 per cent. of the agricultural population is in collective farms. The march of mechanisation is very evident in Russia, as one would naturally expect, and the number of tractors has increased a hundredfold since 1924. Stalin is reported to have stated that he was aiming at a grain harvest of 130 million tons. If this is achieved, Russia, indeed, will become once again a dominant factor in the world's grain supplies.

## Pyremist

We have recently received particulars of a new process for the control of Indian Meal Moth and Cacao Moth in warehouses. On numerous occasions we have referred to the losses caused by insects in food industries and several articles on methods of fumigation have been published in FOOD MANUFACTURE and the FOOD INDUSTRIES MANUAL. In most methods of fumigation recourse is made to poisonous chemicals and gas. While these are very effective as far as killing the insects is concerned, their application is of necessity limited owing to the great risk of contamination to the products stored in the wharves or warehouses. With a view to finding more suitable means for protecting the stocks of the Australian Dried Fruits stored in the London Docks from the attack of the Indian meal moth and the cacao moth, exhaustive investigations were carried out at the Imperial College of Science and Technology. The Indian meal moth infests oatmeal, nuts, raisins, currants, and dried fruits in general, while the cacao moth is more frequently found in coco-pods, chocolate, tobacco, figs, nuts, and biscuits.

## Methods of Control

In order to devise methods of control, it was first necessary to study the life-cycle and habits of the moth. They spend the winter as full grown caterpillars encased in cocoons. These begin to pupate in May, and emerge as moths as soon as the warm weather approaches in June. The eggs are laid on the food material or very close to it between boxes or sacks. These hatch out in about seven days, and in a month become fully grown caterpillars. In single-storied warehouses there are usually two generations during the year. The method of control devised by Porter of the Imperial College of Science and Technology is designed to kill the moths as they emerge in the spring, but it can also be used to reduce an infestation of larvæ in goods and prevent it spreading to other parts of the warehouse. It depends on the penetrating power of a very finely atomised solution containing the active principles of pyrethrum. Frequent reference to the insecticidal properties of pyrethrum has been made both in this Journal and in *The Manufacturing Chemist*. The real success of the treatment depends on the very fine degree of atomisation of the spray solution. The spray should be broken up into a very finely divided condition so that a fog or " particulate cloud " of insecticide is produced. If the atomisation is effective a cloud of insecticide will remain suspended for several hours forming a lethal atmosphere. The amount of insecticide required is about one ounce for every thousand cubic feet of free air space. The pyrethrum insecticide is almost odourless and tasteless and does not impart any foreign flavour to the food. In order to provide the most suitable and convenient form of pyrethrum insecticide, Messrs. Stafford, Allen and Sons have introduced a preparation called " Pyremist ", which is ready for use and free from any waxy particles.

# FRUIT SYRUPS for FLAVOURING MILK

by Vernon L. S. Charley, B.Sc.

(Department of Fruit Products [including Cider], University of Bristol Agricultural and Horticultural Research Station, Long Ashton, Bristol)

THE IDEA of incorporating pure fruit syrups in milk did not occur to the writer until October last year, by which time it was impossible to make up any special syrups with low acid contents. However, since that date a number of syrups from a variety of sources have been tested, and a selection of these data are given in Table II.

Fruit syrups, to be satisfactory when mixed with milk to form milk shakes, must satisfy the following four conditions:

(*a*) The flavour must be clean and characteristic of the fruit used. The added flavour should by no means overpower that of the milk.

(*b*) The sugar of the syrup must not mask the fruit flavour or impart a cloying sweetness to the milk shake.

**The author of this article, Mr. Vernon L. S. Charley (right), who is in charge of the Fruit Products Research at Long Ashton, in discussion with visitors on the occasion of the annual Field Day at Long Ashton, on May 7th. ("Food Manufacture" Photograph.)**

(*c*) The mixture should not curdle.

(*d*) There should be sufficient acid character to bring the fruit flavour into prominence.

Great stress is laid on the first condition. Unless the syrups impart a true fruit flavour to the milk shakes, there would seem to be little point in using them, for other materials are easily procurable for flavouring purposes. Tests carried out at Long Ashton show that heavy syrups from raspberry, loganberry, whortleberry, blackcurrant and strawberry do give pleasantly flavoured fruit milk shakes. Strawberry gives a delicious beverage, but the fruit character is not so intense as that of other fruits.

The sweetness is a matter that is easily adjusted. It appears that 50 per cent. is a correct sugar content for the syrup, and as this concentration of sugar is not sufficient to prevent fermentation, some form of preservation is essential (100 p.p.m. of $SO_2$ should give satisfactory stability).

The curdling problem, which at first seemed likely to prove a real danger, has since been overcome. The crucial condition to observe when syrups are being prepared is that no other acid whatever should be added. The only cases where curdling has occurred in shakes made up with 100 : 10 or 100 : 20 of milk to syrup have been those in which citric acid was added to meet the requirements of syrups to be diluted for mineral water purposes. The incidence of curdling appears to be correlated more with *p*H than with titratable acidity, but despite the accumulated data that is now available the phenomenon is not yet fully understood. Two sets of buffers are involved, those in the milk and those in the fruit syrups, and until more work is carried out it will not be possible to elucidate their several effects. But the data do tend to show that with most of the syrups there should be no danger of curdling in 5 : 1 mixtures, provided the syrups are made entirely from pure fruit juice and sugar.

The closer examination of the curdling problem is urgently needed, for it is necessary for some amount of acid to be present, as this always tends to bring the fruit flavour into prominence. It is important to know the exact limit for acidity which is safe, and then syrups with lower acidities can be suitably treated to attain this figure.

It is interesting to observe the lack of any definite correlation between *p*H and titratable acidity (see Table I., overleaf). In the concentration of apple juice it has often been noticed that the *p*H remains practically constant, but the acid taste increases, and although the concentration of juices *in vacuo* to about half their volume (and then syruping the concentrate to 60 per cent. sugar content with added sugar) may effect some increase in flavour, the enhanced sharpness of taste places a limit beyond which this process cannot be effective.

In pure milk, curdling commences at a *p*H of 5·5 and

TABLE I.—CHEMICAL AND FLAVOUR DATA ON FRUIT SYRUPS AND MILK SHAKES.

| | SYRUP. | | | | SYRUP-MILK MIXTURE. | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *Fruit.* | *Special Features.* | *Sugar (Per Cent.)* | *pH.* | *Citric Acid (Per Cent.)* | *Milk-syrup Proportion.* | *pH.* | *Citric Acid (Per Cent.)* | *Curdling Test.* | *Flavour.* |
| Strawberry ... | Heavy syrup, 4 years old | 66 | 5·85 | 0·44 | 100 : 20 | 5·52 | 0·13 | – (no curdling) | Too sweet but delightful fresh fruit flavour |
| ,, | Light syrup | 44 | 4·66 | 0·44 | 100 : 20 | 6·15 | 0·12 | – | Very good |
| Raspberry ... | Heavy syrup, 4 years old | 66 | 4·18 | 0·76 | 100 : 20 | 5·71 | 0·17 | – | Too sweet. Fresh fruit flavour |
| ,, | As used in milk bars | 52 | 3·77 | 0·32 | 100 : 20 | 6·48 | 0·06 | – | Full flavour, not true to fruit |
| Loganberry ... | Heavy syrup, 1 year old | 64 | 4·16 | 0·98 | 100 : 20 | 5·63 | 0·15 | – | Excellent fruit flavour. Distinctly acid. Too sweet |
| ,, | Light syrup (citric acid added) | 35 | 3·10 | 2·59 | 100 : 15 | 4·78 | 0·29 | + (curdled) | Too acid |
| Blackcurrant... | Heavy syrup, 10 years old | 62 | 4·50 | 1·09 | 100 : 20 | — | — | – | Very good |
| Whortleberry | Heavy syrup | 60 | 3·76 | 0·49 | 100 : 20 | 6·12 | 0·11 | – | Intriguing character |
| Blackberry ... | Light syrup | 44 | 3·68 | 0·92 | 100 : 20 | 5·65 | 0·19 | – | Good |
| Orange ... | Concentrated juice | 74 | 5·04 | 5·50 | 100 : 20 | 4·22 | 1·33 | Barely + | Too intensely flavoured |
| Lemon ... | Concentrated juice | 42 | 5·04 | 28·17 | 100 : 5 | 3·63 | 1·38 | Barely + | Too acid |

TABLE II.—DETAILED COSTS FOR 65 PER CENT. SUGAR SYRUPS.

| *Cost of Fruit Per Ton.* | *Cost of Juice Per Gallon.* | *Cost of Juice used for 1 Gallon Syrup.* | *Sugar needed for 1 Gallon Syrup.* | *Overheads Per Gallon.* | *Total Cost Per Gallon of Syrup.* |
|---|---|---|---|---|---|
| £ | s. d. | s. d. | s. d. | s. d. | s. d. |
| 5 | 7 | 3 | 1 6 | 1 0 | 2 10 |
| 10 | 1 3 | 7 | 1 6 | 1 0 | 3 2 |
| 15 | 1 10 | 11 | 1 6 | 1 0 | 3 5 |
| 20 | 2 6 | 1 3 | 1 6 | 1 0 | 3 9 |
| 25 | 3 1 | 1 7 | 1 6 | 1 0 | 4 1 |
| 30 | 3 9 | 1 11 | 1 6 | 1 0 | 4 5 |
| 35 | 4 5 | 2 2 | 1 6 | 1 0 | 4 8 |
| 40 | 5 0 | 2 6 | 1 6 | 1 0 | 5 0 |
| 50 | 6 2 | 3 1 | 1 6 | 1 0 | 5 7 |

is completed at *p*H 4·7, this latter figure coinciding with separation into curds and whey. The complicated system of buffering agents present in milk and fruit syrups is likely to modify slightly these figures when milk shakes are considered. Curdling was not observed when *p*H values of 5·07, 4·88, and 4·80 were found in the milk shakes. The acidities of these milk shakes were 0·28, 0·30, and 0·37 per cent. of citric acid respectively.

## Costs of Fruit Syrups

The data contained in Table II. are calculated from the small experimental batches of syrups made at Long Ashton. No attempt has been made to convert these data to commercial scale operations, but the figures do afford an indication of the variation of cost with the differently priced fruit.

## Manufacturing Details

Full particulars on these are available from the Research Station at Long Ashton, but brief mention will be made of the procedure recommended for fruit syrups.

The fruit must not be mouldy, mildewed, or attacked by spoilage bacteria to any appreciable degree. The berries discarded at the cannery are suitable for the purpose, as also are small, misshapen, or over-ripe fruit unsuitable for the dessert market.

The fruit should be milled and allowed to undergo a slight preliminary fermentation during which the alcohol content should not rise greatly in excess of 1 per cent. by weight. The fermenting mass is pressed out in a hydraulic press (developing 200 tons total pressure) and clarified by sedimentation or by the centrifuge.

Filtration of the cleared juice is effected, with or without the use of pectinous or nitrogenous decomposing enzymes, by the plate and frame filter (which is also suitable for filtering the finished syrups) or the ordinary form of pulp filter, which does not fulfil the dual note so satisfactorily. The filtered syrup should then be mixed with sugar (cane or beet: invert or sucrose) and the syrup treated with citric acid (for beverage purposes only) and colour. Pasteurisation is effective if carried out at 165° F. for ½ hour, whilst 250 to 300 p.p.m. of $SO_2$ are similarly potent. Syrups with less than 60 per cent. sugar should be preserved by some such method.

# Incorporating
# FLAVOURS in FOODSTUFFS

By F. Wilkinson
(Of A. Boake, Roberts and Co., Ltd.)

THE SCOPE of this article is confined to the problems which arise when various kinds of foods are to be flavoured. No attempt will be made to discuss the suitability of particular flavours from the taste point of view. The question of what flavour may be said to harmonise with a certain food, the degree of flavour desirable, are points about which there has been, and will continue to be, a great deal of controversy.

## Available Flavours

It may be as well roughly to classify the forms in which flavours are available. In the first place there are the spices, which are generally used in a finely ground state; they belong to the oldest type of flavouring material. The citrus peels, either dried or candied, could be included in this group. Next come the various fruit juices, which can sometimes be used as they are expressed, and are so referred to as "single" juices, or else they can be used in a concentrated form. Then there is the vast range of manufactured essences, which may be concentrations of fruit products, or fruit extracts with essential oils and synthetics added, or blends of synthetic products only. A number of essential oils are used extensively in the food trades, and form their own flavour group.

## Forms of Flavours

Essences are offered to the food manufacturer in several forms according to the purpose for which they are intended. The most general form, and the oldest, is the clear liquid in which ethyl alcohol, isopropyl alcohol, or one of the various glycol esters is used as the solvent. For other purposes one of the edible oils or fats is used as the solvent, and the flavour is then presented as a viscous liquid or as a more or less solid paste. Again, many flavours are being used at the present time in the form of emulsions, such emulsions being based upon a mucilage. Finally, there has been the comparatively recent introduction of flavours in the form of dry powders.

**This illustration shows a typical mixer fitted with a very efficient mixing gear, suitable for effecting the best possible dispersion of colours and flavours throughout foodstuffs. The makers, Wm. Brierley, Collier and Hartley, Ltd., state that the scrapers and blades come within the run of each other.**

## Incorporating Flavouring Materials

In considering the practical use of all these different kinds of flavourings, it must be borne in mind that flavour is usually present in a prepared food in an emulsified state. The higher the degree of emulsification or dispersion that can be attained the more evenly and better flavoured will the foodstuff be.

**Spices.**—When ground spices are used in such goods as meat choppings there is little to be done to assist the chopping or mixing machine; indeed, it is only a question of how long the machine is run as to the degree of flavour dispersion obtainable. That there is a limit to the evenness of flavouring with the spices will be realised when it is remembered that the flavour occurs in small sacks or cells distributed throughout the fibrous matter composing the spice, and until these cells are ruptured no greater dispersion of the aromatic bodies is possible. The ordinary chopper or mixer would not disrupt the flavour cells.

**Fruit Juices.**—Where fruit juices can be used just as they are expressed, their application presents little difficulty. In the beverage trades the problems connected with fruit juices are generally those of fermentation and not of mixing. The concentrated juices are viscous, and are not so readily mixed as the "single" juices, but for beverage making they can usually be thinned out with a certain amount of syrup before being added to the batch, and in sugar confectionery they may be mixed to a paste with fine sugar before being added to the bulk.

**Essences.** — Essences of various kinds are by far the most important form in which flavours are used. The

main function of the essences industry is the economic transfer of flavour in as concentrated a form as possible from the parent substance to a vehicle suitable for use in foodstuffs. The essence manufacturer strives to reproduce in his essence truthful and pleasant flavours, for however applicable a flavour may be, using the word in the sense defined in the opening paragraph, it will obviously not be acceptable if the taste is poor. At the same time this question of applicability *must* be considered, for unless the essence disperses readily it is useless as a flavouring medium.

Liquid essences prepared with alcohol or alcohol substitutes are used in every class of food and beverage. They are saturated solutions of volatile oils, aromatic resins, and synthetic materials, and their flavouring portion is thrown out of solution if water is added to the essence or if part of the solvent is allowed to evaporate. If an essence is poured immediately into a large volume of water, sugar syrup, or batch of boiled sugar, the flavouring materials will in most cases rise to the surface as large globules, but if the essence be added drop by drop, whilst the mixture is being violently agitated, then a very stable dispersion can be formed having little tendency to break or separate.

In the case of mineral water syrups this slow addition of the essence is doubly important. For ginger beer, the concentration of flavour is deliberately balanced so that when the essence is used it forms a permanent milk or cloud in the bottle, resembling the cloudiness of brewed ginger beer; but if the essence be poured in hastily and stirring is inefficient, after about two or three days the resins will form an ugly brown ring in the neck of the bottle, and the drink will be deficient in flavour. Similarly with lemon and other flavourings, careless addition means separation and subsequent loss, for the large separated globules of flavour are retained in the filter bag or left behind on the sides of the mixer.

Boiled sugar on the slab is similar to a batch of syrup, and here the agitation consists of working with the hands or pulling on the hook. A preliminary dispersion of flavour can be effected by mixing the essence intimately with the powdered tartaric or citric acids. Another factor which enters in confectionery work is that of temperature. As has been pointed out previously, flavour separation can take place in the essence itself through evaporation of the solvent; when the essence comes in contact with the hot sugar, evaporation commences and must be checked by quickly folding the mass.

Toffees and caramels are flavoured in the pan. On the one hand, the essence has the help of good mechanical agitation, but, on the other hand, it has to withstand higher temperatures than are encountered in other kinds of sugar confectionery. The flavour has to be dispersed in the fat-sugar mass which constitutes the toffee. Lecithin is a good emulsifier for such mixtures, and it has also been found to assist the flavour dispersion quite effectively.

Various powder goods such as cornflour mixtures, custard powders, and the like present their own problems. When these lines are made in fairly large batches with the aid of mechanical mixers, probably the best way of applying the essence is by means of a blower worked on the scent-spray principle. The difficulty is that there is very little flavour penetration on flour, and consequently a relatively large surface is exposed to evaporation; there is a serious loss of flavour, for the evaporation goes on progressively until the material is used, although it can be checked to some extent by efficient packing. If the essence is not dispersed mechanically it should be mixed intimately with a portion of the cornflour, or whatever the powder may be, in a mortar or edge runner, and should then be added to the bulk. Twenty parts of cornflour will retain one part of essence and still remain friable.

**Special Flavours.**—For the large class of foodstuffs which are prepared with fats, special flavours have been made which are themselves based on an edible oil or fat. It has been found that when liquid essences are used in such goods as biscuit fillings, toffees, etc., there is a tendency for the flavour to "sweat" on to the surface of the piece; and sometimes this is so marked that the effect of presenting a high concentration of flavour to the palate is nauseating. Fat soluble flavours overcome the difficulty, for they give a much better dispersion, and, incidentally, they have a slightly greater resistance to heat. When lecithin is used at the same time there appears to be an additional emulsifying effect. These flavours can also be used in flour confectionery of the custard powder type, but they can only be incorporated by running in an edge runner with a portion of the flour exactly as suggested for a liquid essence.

**Flavouring Emulsions.**—Flavouring emulsions seem to

**The Gardner Patent "Rapid" combined Sifter and Mixer with sprayer for adding essences, flavouring and perfumes.**

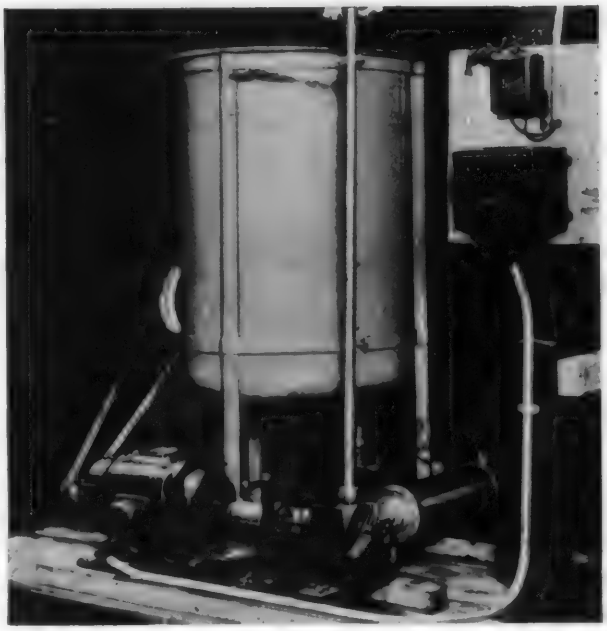
be used more generally in America than they are here. In this country they are practically confined to the bakery trade, where they are used as flavour-colour compounds. At first sight a good emulsion would appear to be the ideal vehicle for every flavouring purpose, and no doubt other applications could be found for emulsions, but there are certain difficulties in connection with their manufacture which do not permit of the very finest flavours being offered in this form. However, they are used in the bakery for flavouring and colouring fancy icings, etc., and also find some application in the beverage trades. The same remarks regarding their use apply as for liquid essences.

**Powder Flavours.**—Such flavours are now being manufactured which have certain definite advantages. They are simply mixed with the other ingredients, and no special precautions are necessary.

**Essential Oils.**—Essential oils are used very widely in the food trades, but their disadvantages are that they are not easy to mix and do not keep well. In boiled sweet work they are generally mixed intimately with the acid before adding to the batch, but recently it has been found that if the oil is first mixed with an equal volume of some high boiling solvent before use it will not only disperse more easily, but, moreover, less of the flavour is lost through evaporation. Diacetin is employed in conjunction with peppermint oils in clear mints, and much more flavour is retained than when the oil is utilised alone.

## Conclusion

The flavour itself must always receive first consideration, but, given the desired flavour, the essence must be in such a form as to be most readily applied to the particular foodstuff. Furthermore, it must constantly be borne in mind that satisfactory flavouring of foodstuffs is dependent upon the degree of mixing, dispersion, or emulsification that is achieved. The better the dispersion the better will be the flavouring result.



**A Pfaudler Glass-lined combined syrup mixer and filter at the Planet Table Water Co., Ltd., of Birmingham.**

# ANNUAL MEETING of FOOD GROUP

## Dr. Franklin Kidd follows Dr. Lampitt

DR. L. H. LAMPITT has resigned from the chairmanship of the Food Group, which he has occupied with such distinction since the founding of the group in 1931, and the Committee have appointed Dr. Franklin Kidd, M.A., D.Sc., who is Superintendent of the Low Temperature Research Station at Cambridge, to succeed him. Other officers who have served the group from its inception, whose resignations have been accepted by the Committee with equal regret, are Mr. B. G. McLellan, Chief Chemist of Rowntree and Co., Ltd. (Vice-Chairman), and Professor H. Raistrick, F.R.S. (Hon. Secretary). Professor Raistrick, who is Professor of Bio-Chemistry at the University of London, has now been appointed Vice-Chairman, and Mr. E. B. Anderson, Chief Chemist of United Dairies, Ltd., becomes Hon. Secretary. Dr. H. E. Cox remains Treasurer. The retiring members of the Committee are Messrs. A. L. Bacharach, Osman Jones, Dr. R. T. Colgate and Dr. J. W. Corran, and in their places the Committee have appointed Dr. Lampitt and Mr. B. G. McLellan, whose valuable services to the group will thereby be retained. The two members elected to the other vacancies by ballot are Dr. D. W. Kent-Jones, well known in food circles, and Mr. A. J. C. Cosbie, Chief Chemist of Truman, Hanbury, Buxton and Co., Ltd., the London brewers.

### Professor Waldschmidt-Leitz Addresses Annual Meeting

The Annual General Meeting of the Food Group was held on Wednesday, May 13, at the London School of Hygiene and Tropical Medicine, when an address was delivered by Professor E. Waldschmidt-Leitz, of Prague, on "Recent Developments in Enzyme Chemistry". Professor Waldschmidt-Leitz spoke with facility in the English language and elucidated the intricate chemistry of enzyme bodies in a most interesting manner. He covered the entire field of their development, though not, of course, their practical uses in various processes of manufacture. His lecture will undoubtedly prove a source of considerable inspiration to those whose interests are specially linked with the subject.

### The Annual Dinner and Cabaret

The Annual Dinner of the group took place the same evening at the Trocadero Restaurant, where there was a large gathering of members and distinguished guests. Dr. Lampitt, who was in the chair, proposed the toast of the House of Commons, coupled with the name of Mr. L. H. Gluckstein, M.P., who, in his reply, particularly emphasised three things: The necessity for developing an understanding between Parliament and science, the important rôle played by the Food Group in the welfare of the country, and the urgency of preparing our defences in case of war by creating reserves of suitable foodstuffs. Mr. A. L. Bacharach proposed the toast of the guests in a scintillating speech, to which Mr. B. Seebohm-Rowntree and Sir William Bragg, President of the Royal Society, replied. The dinner was of the usual excellence offered by J. Lyons and Co., Ltd., but the carbaret hardly came up to Trocadero standard.

# FOOD COLOURS

**The Legal requirements, their selection and methods of incorporation in different types of foodstuffs, are discussed by HAROLD SILMAN, B.Sc., A.I.C.**

THE ARTIFICIAL colouring of foods, especially processed foods, is now such an integral part of the industry that it is already an anachronism to discuss its legitimacy. It is recognised that, with reasonable safeguards, synthetic colours are, indeed, highly desirable ingredients in foodstuffs on account of the great part they play in rendering them appealing to the palate. An attractive appearance in foods is desirable from a nutritional point of view, but when we come to deal with the subject from the sales aspect it becomes very probable that the influence of colour is far more pronounced than has hitherto been imagined, and is at least as important a factor as flavour.

A highly developed sense of taste is a comparative rarity. Perhaps the universal tobacco habit has something to do with it. Suffice it to say that a large number of people rely to an unsuspected extent on their sense of colour when it comes to the "taste" of their food. A recent investigation carried out in conjunction with an important firm of food manufacturers has provided astonishing evidence in favour of this viewpoint.[1] A group of 60 persons drawn from all classes of society, including directors, salesmen, factory girls, storesmen, etc., were invited to identify the flavours of four well-known fruit jellies which had been coloured in a different way than is usual. The respective colours were as follows:

| *Flavour.* | *Colour.* |
|---|---|
| Vanilla | Yellow |
| Orange | Green |
| Lemon | Red |
| Lime | Amber |

Marks were awarded for correct identification of flavour; only one individual secured 100 per cent. correct results, the numbers obtaining various percentages being as follows:

| *Percentage of Full Marks.* | |
|---|---|
| 100 per cent. .. .. .. | 1 |
| 75-99 ,, ,, .. .. .. | 4 |
| 50-74 ,, ,, .. .. .. | 17 |
| 25-49 ,, ,, .. .. .. | 22 |
| 0-24 ,, ,, .. .. .. | 16 |

The least discriminating were, moreover, the most dogmatic in insisting on their correctness. The diversity of some of the guesses was also surprising. For instance, the lemon jelly was variously described as cherry, pineapple, vanilla, and red currant, among others.

In a similar test, in which two brown-coloured biscuits were flavoured with vanilla and chocolate respectively, over half of those examined stated that the biscuits were unflavoured; 7 per cent. of cocoa was used to impart the chocolate flavour. The actual results were as follows:

| | *Chocolate.* | *Vanilla.* |
|---|---|---|
| No flavour .. | 28 | 35 |
| Wrong .. .. | 7 | 8 |
| Correct .. .. | 25 | 17 |

The results of such a test as this are noteworthy, inasmuch as they serve to stress the importance of colours in food. A colour should be suggestive to the eye rather than blatant, and should delicately insinuate the essential goodness of the foodstuff. It should, moreover, be absolutely invariable, as it is a common experience for a manufacturer to receive complaints of a deterioration in the flavour of his product when all that has happened is that a slight change has been noticed in the colour.

## Legal Requirements

In this country the food manufacturer is largely in the hands of his supplier as far as colours are concerned, owing to the nature of our food regulations. These come under a number of different headings. The fundamental law governing food colours is the Sale of Foods and Drugs Act, 1875, whereby "no person shall colour, stain or powder any article of food with any ingredient or material so as to render that article injurious to health". The vagueness of this law caused serious difficulties in its administration, as there was no agreed definition as to what constitutes injury to health. After a serious outbreak of poisoning, due to arsenic in beer, had occurred in the north, a Royal Commission was appointed to enquire into the subject in 1903, as a result of which a recommendation was made that no article of food should contain more than 1·4 parts per million of arsenic. No recommendation was made in regard to heavy metals on account of the limited scope of the enquiry.

The whole matter of colours and preservatives was reviewed once more in 1924 by a Departmental Commission, which confirmed the previous recommendation with regard to arsenic, and added that the maximum total permissible amount of heavy metals should not exceed 20 parts per million. These recommendations have not yet been legalised, but, as a result of the enquiry, it is now forbidden to use the following synthetic dyes in food:

picric acid, Victoria Yellow, Manchester Yellow, Aurantia and Aurine. The vegetable dye gamboge has also been forbidden. Apart from these, any dyestuff may be used, and there is no legal definition of the standard of purity required. A provisional standard has, however, been accepted by a Joint Committee of the Society of Public Analysts and the Association of British Chemical Manufacturers[2] to the effect that not more than 3 parts of arsenious oxide per million should be allowed when there is not more than 1 part of colour to 2 of diluent, and in a straight colour not more than 5 parts per million. No decision has yet been reached in regard to other metallic impurities. Under the existing regulations it is prohibited to use any compound of antimony, arsenic, cadmium, chromium, copper, mercury, lead, or zinc for colouring foods.

## American Practice

Many countries have a list of permitted colours, and only those on the list may be used in food. The most rigid system of control is that in force in the U.S.A., and it is of interest to note where it diverges from English practice. Only 15 colours are at present permitted; these are the following:

| *Colour Index.* | *No.* | *Colour Index.* | *No.* |
|---|---|---|---|
| Brilliant Blue FCF | — | Indigo Carmine XS | 180 |
| Fast Green FCF .. | — | Guinea Green B .. | 666 |
| Light Green SF .. | 670 | Amaranth AS .. | 184 |
| Ponceau 3R .. | 80 | Erythrosine AS .. | 773 |
| Ponceau 2R .. | — | Naphthol Yellow S | 10 |
| Sunset Yellow FCF | — | Tartrazine AS .. | 640 |
| Orange I .. .. | 150 | Oil Yellow AB .. | 22 |
| Oil Yellow OB .. | 61 | | |

Before a new colour can be entered on the permitted list, its mode of manufacture must be made public, and there must be no patents restricting any stage of the process, so that it may be freely made by all. The colour must also pass exhaustive physiological tests to ensure its harmlessness. In addition, no batch of a colour may be sold before a sample has been analysed by the Colour Certification Laboratory of the Food, Drug and Insecticide Administration of the Federal Department of Agriculture. It is tested for toxic ingredients and, if it is passed, a certificate is issued giving the percentage purity of the batch and a number, which must appear on all packages of the colour sold.

## Other Countries

There is an extraordinary divergence of official opinion regarding what is and what is not a permissible colour, and, in fact, there are not more than two or three colours which can be said to be universally acceptable. These include Erythrosine, Naphthol Yellow, and Orange I. Table I. overleaf shows these differences for a few common colours. All those mentioned in the table are permitted in the United Kingdom, Ireland, South Africa, India, and the West Indies, which have the same regulations in regard to food colours. There is need of legislation in this matter, and one of the leading firms of colour manufacturers has been carrying out pioneer work for some years with a view to securing sufficient data to enable them to place a list of satisfactory colours before the Home Office for the purpose of achieving legal enactment.

In Canada the maximum amount of colour permissible in a foodstuff is limited to 2 gr. per lb. In Belgium tin is added to the list of metals, compounds of which are prohibited for food colouring. In this country a good many toxic metals are not officially on the list, but legal action can be taken, if necessary, under the provisions of the Act of 1875.

## Sampling of Colours

The prohibited colours in this country are all yellows which possess the property of dyeing cellulose acetate with different degrees of intensity. Most of the permitted colours, on the other hand, do not dye cellulose acetate, and this provides a ready means of identification.

As colours are used generally in the proportion of from 1 part in 2,000 for foodstuffs down to 1 in 20,000 or 50,000 for mineral waters, testing was formerly a very difficult matter for the Public Analyst. The Medical Officer of Health is, however, now permitted to enter any factory and take samples of "*any article* which ordinarily enters into or is used in the composition or preparation of foodstuffs for human consumption".[3] Hence the manufacturer can be prosecuted for having colours injurious to health in his possession, and, although the amount of toxic material in the finished product may be almost infinitesimal, he is not absolved from responsibility. This is justifiable inasmuch as certain poisons are cumulative in their action, whilst some are more injurious in dilute solution than in concentrated solution.

Generally speaking, despite the weak state of the law, British manufacturers have a high sense of responsibility in regard to food colour manufacture. Although no outstanding advances have been made in recent years in the way of new colours, steady progress has been noticeable in the methods of manufacture.

## Modern Colour Manufacture

Formerly, in producing a synthetic food colour, a selected batch of an ordinary textile dye was submitted to an arbitrary purification process consisting of recrystallisation, reprecipitation, etc., which gave a product of a fairly satisfactory nature. This method is still adhered to where a user specifically asks for a certain dyestuff for colouring. However, it is now usual for the large concerns to manufacture a certain number of colours specially for food purposes, utilising plant of an inert nature to avoid contamination with metallic salts. After purification the colour is subjected to analysis, and is generally packed in linen bags before being placed in tin containers. The latter precaution is important since many colours readily absorb moisture and cause rusting of the metal. The containers should always be kept well closed.

TABLE I.

The colours listed below are all permitted in the United Kingdom, Ireland, South Africa, India, West Indies, and in the countries marked with an asterisk below.

| *Colour.* | *Dyestuff.* | *C.I. No.* | *Canada.* | *New Zealand.* | *Australia.* | *U.S.A.* | *France.* | *Denmark.* |
|---|---|---|---|---|---|---|---|---|
| Red ... | Amaranth AS | 184 | * | * | * | * | * | — |
| | Bordeaux B | 88 | — | — | — | — | * | * |
| | Brilliant Scarlet 4R | 185 | — | * | — | — | * | — |
| | Geranine 2GS | 31 | — | — | * | — | — | — |
| | Erythrosine AS | 773 | * | * | * | * | * | * |
| | Rhodamine B | 749 | — | — | * | — | — | — |
| | Carmoisine WS | 185 | — | — | * | — | * | — |
| | Ponceau 2R | 79 | — | — | * | — | * | * |
| | Ponceau 3R | 80 | * | * | *[1] | — | * | * |
| | Sudan I | 24 | * | — | — | — | — | — |
| Yellow ... | Orange I | 150 | * | * | * | * | * | * |
| | Sunset Yellow FCS | — | — | — | — | * | — | — |
| | Naphthol Yellow FYS | 10 | * | * | * | * | * | — |
| | Tartrazine AS | 640 | * | * | * | * | — | — |
| | Oil Yellow AB | 22 | * | * | *[1] | * | — | — |
| | Oil Yellow OB | 61 | * | * | *[1] | * | — | — |
| Green ... | Light Green SF | 670 | * | * | *[1] | * | * | — |
| | Guinea Green B | 606 | — | — | * | — | — | — |
| | Fast Green FCF | — | — | — | *[1] | * | — | — |
| Blue ... | Indigo Carmine XS | 1180 | * | * | * | * | * | * |
| | Patent Blue | 712 | — | — | — | — | * | — |
| | Brilliant Blue FCF | — | * | — | * | — | — | — |
| | Soluble Blue | 707 | — | — | * | — | * | * |
| | Blue AS | 714 | — | * | — | — | * | — |

[1] Except Queensland and South Australia.

## Diluents

It is usual in the trade to mix the dye with some inert material such as dextrin, sugar, salt, sodium sulphate, etc. It is said that by this means the colour is more easily standardised. The actual colour of a dye as produced is somewhat variable, for this depends to a considerable extent on its physical state. Thus if the particles are very fine the colour will appear somewhat darker. In order to overcome these difficulties it became common practice to reduce the powder to a standard shade with an admixed neutral material. The practice has in some instances been abused in order to lower the percentage of an injurious ingredient. Dilution for this purpose is of little use, as a correspondingly greater amount of colour is required to produce the desired intensity.

## Buying Colours Economically

Despite the fact that it is perhaps easier to manipulate colours containing a neutral diluent, large-scale users should, for preference, specify "batch strength" colours as far as possible. The reason for this is that no manufacturer will give any kind of a guarantee as to the proportion of real dye contained in his product. Thus a colour which is cheap in price may be actually expensive because of the comparatively large amount that must be used to give the required depth of colour. Even in the case of "batch strength" dyes, there is no guarantee as to the percentage purity of the sample, but the purchaser can generally depend on a purity of 85 to 90 per cent. Although "batch strength" dyes will cost him a little more in the first instance they will prove decidedly more economical in use, and will, moreover, make it possible for him to make comparison with other "batch strength" colours in order to ensure that the one he is using is best suited to his purpose.

Most suppliers specify their "batch strength" colours on the basis of their ordinary marketed products, which are taken as 100 per cent. Thus a colour of "143 per cent." strength merely signifies that the material contains 43 per cent. more actual dye than the usual diluted colour, whatever that may be. This leaves the purchaser in the dark as to what he is getting for his money, and it would be an advantage to all concerned if the manufacturers would state without equivocation the percentage of real colour in any product they place on the market.

All reputable suppliers now market the various primary colouring materials under the number given to them in the Colour Index. For example, if the user purchases Erythrosine AS for his canned cherries he knows that he is obtaining a definite chemical, the formula and properties of which are well known and open to inspection. He is also aware that wherever he buys it the material is the same, apart from the amount of diluent which may be mixed with it. If, on the other hand, he purchases X's Cherry Red he has no such guide as to constitution and can have no check on the value he is getting. It is therefore decidedly to his advantage to purchase primary

colours listed in the Colour Index and sold under their accredited names. From these he may be able to blend most of the colours he requires with a little experience.

Of course, in certain instances he may find it necessary to use named colours, as, for example, when he is unable to match up a required shade. In other cases certain mixed colours are the result of a good deal of research work by the supplier, and may contain special ingredients to confer unusual properties. For instance, in the canning of peas the colour must be one which will stain the outer layer of the vegetable without penetration, and should colour the liquor as little as possible. Here the consumer is dependent on the supplier to sell him a compound which embodies these requirements. Even in the case of such blended colours it should not be impossible for the manufacturer to indicate the percentage of actual colour present. The use of colours of known constitution is important if the product is intended for export, in order to ensure that it complies with legal requirements in the country of destination.

## Colour Mixing

When blending two or more colours to produce a given shade, one or two points must be borne in mind in order to ensure success. Most food colours are acid dyes, but there are a few basic colours. An acid dye should not be mixed with a basic dye. Bismarck Brown, for example, is a basic dye, and is readily precipitated by most colours. In some instances addition of a little sodium carbonate will prevent precipitation of the colour. Again, colours differing widely in solubility should not be mixed together. The best guiding rule to ensure successful blending and to eliminate the possibility of interaction is only to mix colours which are similar in constitution and properties.

TABLE II.—CHARACTERISTICS OF CERTAIN FOOD COLOURS.

| | |
|---|---|
| *Yellow GS* ... | Readily affected by acids. |
| *Orange I* ... ... | Not fast to alkalies. |
| *Purpurine 4BS* ... | Turned blue by acid. Sensitive to heat and preservatives. Solution gelatinises when cold. |
| *Erythrosine AS* ... | Completely insoluble in acid solutions. |
| *Rose BS* ... ... | Sensitive to light. |
| *Indigo Carmine XS* | Affected by acids, alkalies, heat, and preservatives. |
| *Blue AS* ... ... | Sensitive to fruit acids and benzoic acid. |
| *Rhodamine* ... | Fat soluble, and liable to colour waxed paper. |
| *Acid Yellow G* ... | Reddened by fruit acids, and therefore unsuitable for blanc mange and custard powders. |
| *Green GS* ... ... | Readily affected by heat. |

## Making up Solutions

For most purposes the colour is dissolved in water before use. The solution is best prepared by making the colour into a paste with cold water and then adding the required quantity of hot water at 180° F. to dissolve it. Boiling is not necessary, and may affect the brightness of the colour. The dissolving of the colour should be carried out in non-metallic vessels, as the presence of metallic compounds sometimes causes discoloration. After stirring well and allowing to stand till cold, the colour solution is decanted off from any sediment, or preferably filtered. Colours with a high solubility are best to use, but the solutions actually employed should be as dilute as possible consistent with requirements.

## Preservation of Solutions

Solutions of dyestuffs do not keep indefinitely, and it is therefore advisable to make up fresh solutions as often as possible. In the first place there is a tendency for the colour to precipitate out, so that the solution becomes less concentrated, especially in the upper part of the vessel in which it is contained. Most colour solutions are excellent culture media for various moulds, yeasts, and bacteria, and when these develop the colour is either thrown out of solution or bleached, whilst off-odours may sometimes become apparent. In any event it is undesirable to introduce the bacteria into the food.

The colour may be preserved from the fermenting action of micro-organisms by the addition of about 10 per cent. of alcohol, but this is likely to diminish the solubility of the colour. For the baking trade, colours are often prepared with glycerin, but a considerable amount (25 to 30 per cent.) is necessary for effective preservation. Perhaps the best way of preserving a colour solution is by taking advantage of the fact that most organisms do not thrive in acid solution. The dye is therefore dissolved with 1 to 1½ oz. of citric or tartaric acid per gallon; if the solution is to be kept for a long period, ½ oz. of sodium benzoate is also added. To preserve colours for carbonated beverages citric acid is undoubtedly the best.

## Pastes

In certain cases, such as in the making of confectionery, it is necessary to add the colour in paste form. The paste must be smooth and uniform, and the incorporation of a certain amount of glycerin or sugar syrup is an aid to achieving this result. The presence of undissolved colour particles in sweets is recognisable by the fact that they colour the mouth intensely when eaten. This is an undesirable characteristic, and can be corrected by paying careful attention to the condition of the paste before incorporation.

## Dry Colours

One point of special interest to certain sections of the food industry is the comparatively recent introduction of very finely milled colours capable of dry use. This enables them to be added directly to products such as custard powders, sponge mixtures, fruit drink powders, etc., and incorporated in the dry state. A considerable saving of time is thus effected, as it is only necessary to prepare a master batch by mixing a small amount of the powder thoroughly with the colour and adding this in turn to the bulk of the material. When solutions are used, the master batch must be prepared by mixing the

TABLE III.—SOME SUITABLE COLOURS FOR FOOD PRODUCTS.

| | | Solubility.[1] (Oz. per gal.) |
|---|---|---|
| *Confectionery.* | | |
| Yellow | Tartrazine | 16 |
| | Naphthol Yellow FYS | 12 |
| Orange | Sunset Yellow FCS | 16 |
| Red | Carmoisine WS | 8 |
| | Amaranth AS | 12 |
| | Geranine 2GS | 12 |
| | Rose BS | 8 |
| Green | Guinea Green B | 9 |
| Blue | Blue AS | 13 |
| | Indigo Carmine XS | 3 |
| *Margarine, Butter, and Oils.* | | |
| Oil-soluble azo-dyes | Yellow RS | 1 |
| | Sudan I | 3 |
| | Yellow AB | |
| | Yellow OB | |
| *Canned Fruits.* | | |
| Strawberry } Red currant } | Ponceau 2R | 4 |
| Cherry } Plum } | Erythrosine AS | 3 |
| *Preserves, Jellies, etc.* | | |
| Yellow | Tartrazine AS | 16 |
| Orange | Sunset Yellow FCS | 16 |
| | Orange I | 3 |
| Red | Ponceau 2R | 4 |
| | Geranine 2GS | 12 |
| *Mineral Waters.* | | |
| Yellow | Tartrazine AS | 16 |
| Orange | Sunset Yellow FCS | 16 |
| Red | Ponceau 2R | 4 |
| *Meat Products.* | | |
| Sausage meat | Carmoisine WS | 8 |
| | Erythrosine AS | 3 |
| | Ponceau 2R | 4 |
| Polony skins | Purpurine 4BS | 12 |
| *Cereal Products.* | | |
| | Tartrazine AS | 16 |
| | Yellow GS | 5 |
| | Amaranth AS | 12 |
| | Orange I | 3 |

[1] The figures for solubility refer to typical commercial colours, not the pure products.

powder with the liquid and then drying and sieving to avoid the presence of excessive moisture in the finished product, as the presence of any appreciable amount of dampness is likely to cause deterioration and lumping.

It is well worth using dry colours for products of this description on account of the superiority of the finished article and the avoidance of waste; the colours must be specially milled for dry use, as any attempt to use ordinary colours in this way is liable to result in specking.

## Destructive Action on Colours

All colours are affected in varying degrees by heat, and are eventually destroyed by it. Thus, if goods are to be heated or boiled it is preferable, if possible, to add the colour after this has been carried out. Some colours are also bleached by light, especially when exposed to direct sunlight, and those specially susceptible to this action should therefore not be used for mineral waters or confectionery. Sulphur dioxide, used as a preservative in meat products, gelatin, etc., and also present in glucose, is a strong reducing agent to which comparatively few colours will stand up. The best are Erythrosine, Ponceau 2R, Tartrazine, and Amaranth. The colour should be added after the sulphur dioxide has been uniformly distributed in the food. Any attempt to mix the colour into a portion containing a higher concentration of preservative than it is ultimately to encounter will cause fading of the dye and render it difficult to exercise control on the final shade. Many manufacturers adopt the procedure of first adding a small amount of a reducing colour such as Carmoisine to "kill" the sulphur dioxide, incorporating the permanent colour afterwards.

Hydrogen gas is another powerful reducing agent towards colours, and is sometimes generated in cans by the action of acids on the container due to a defect in the lacquer or tin lining. Stability towards acids and alkalies is also desirable, if not always obtainable in colours. Change of shade with differences in *p*H value is a common occurrence.

Certain colours also change considerably in shade as well as intensity on dilution. Orange shades used in the mineral water trade, such as Tartrazine and Ponceau, are not wholly satisfactory when the concentration is reduced. Chrysoidine (C.I. No. 20) and Acid Orange GG (C.I. No. 27) give clear orange shades at dilutions as low as 1 in 50,000, but they are not easily obtainable in a form suitable for the food industry. In Table III. the chief weaknesses of a few well-known colours are listed.

## Vegetable Colours

Although the advent of the aniline dyes has brought about an enormous decrease in the use of vegetable colours on account of the greater intensity, uniformity, and cheapness of the former, there are still a number in common use. Among the chief of these is caramel, which is extensively employed for tinting beers and vinegar, and for use in invalid foods, etc., to conform with labelling requirements. Turmeric was much used formerly in custard powders, and is still employed in compound spices to disguise adulteration. Annatto, formerly the chief colour for milk products, is used less frequently now, whilst its tendency to turn pink in margarine makes it impracticable for colouring the latter product.

Chlorophyll, the green colouring material of plants, is lacking in stability. Cochineal, made from the dried bodies of certain insects, is used in confectionery, whilst saffron is still extensively used by the more conservative elements in the baking trade despite its tendency to turn brown at higher temperatures.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[2] *Analyst*, lv, No. 647, p. 102.
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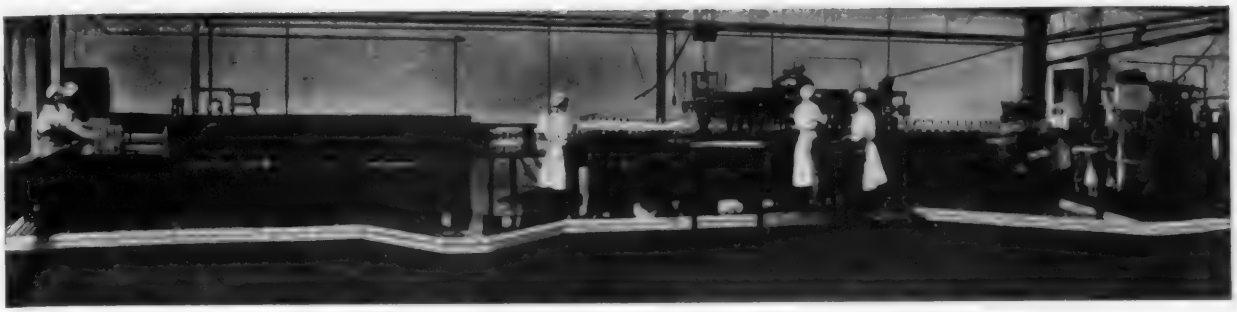


# MINERAL WATERS & their MANUFACTURE

BY THE term "mineral waters" most people to-day think of clear carbonated and flavoured drinks, but long before these became known, mineral waters were known and used extensively. Originally the term "mineral waters" referred only to naturally occurring saline waters containing sodium, potassium, lithium, iron, sulphur, barium, etc., which were found in various parts of the world, and which were accredited with health-giving properties which were almost fabulous. In Great Britain perhaps one of the best-known relics of this early age is St. Winifred's Well at Holywell, North Wales, the waters of which are supposed to cure maladies ranging from rheumatism to cancer. Visitors may see the cast-off crutches, etc., which are supposed to have belonged to people who have partaken of the water and have been cured. There are many such places, and mention is made of them to indicate the origin of the word "Mineral Waters".

Gradually, commercially minded people began to distribute natural mineral waters in bottles, and we still have to-day a few such products which are entirely natural; probably the best-known of these is Apollinaris. With the advent of chemical knowledge, it was found that these natural mineral waters could be manufactured by the addition of various salts to ordinary water which had been carbonated, and this process may probably be considered as the start of the mineral water industry. There are, of course, still a number of mineral waters, artificially prepared in factories, which are sold in considerable quantities to-day, such as tonic waters. It was a small step from such products to the more modern mineral waters which consisted, in the first place, of sugar syrup, suitably coloured and flavoured with various fruit essences. Within the last few years there has been a distinct tendency—incidentally, a tendency from which the trade should benefit—to use the actual fruit juices, and sometimes to permit the presence of a certain amount of fruit cells or pulp. An example of this latter type is the popular carbonated grapefruit.

It is not intended here to give details of the manufacture of the so-called artificial mineral waters, such as have been described above and which, in this country at least, are of secondary importance to the fruit-flavoured drinks. Mention has been made of these other types in order to make clear the type of mineral water which is being considered in this article, and throughout the words "mineral waters" will refer solely to this type of product.

## Manufacture of Mineral Waters

With the exception of ginger beer and a few lesser-known drinks of the same type, which are actually brewed, the manufacture of mineral waters is a relatively simple operation, but in order to run successfully a mineral water business, many points have to be considered. One of the greatest is that of economy, since the selling price has been reduced to such an extent that the margin of profit in manufacture is only relatively small, and will not allow for any excessive wastage or spoilage in the factory.

Essentially, the process for producing mineral waters consists of making a flavoured and coloured sugar syrup of 40° to 50° Twaddell, filling a small amount of this into bottles, and finally, or simultaneously, filling up the bottles with aerated water. The manufacture of sugar syrups was discussed in an article which appeared in the May issue of FOOD MANUFACTURE, and from the remarks made above concerning the almost universally cut prices of mineral waters, it would seem that any reduction in the loss of sugar which can be made will be a very important factor. Usually, the cold process of making syrup is used, but if, for any special reason, the hot process is more convenient, it may also be used. In either case, any additional acid, such as citric or tartaric, should be dissolved at the same time as the sugar, the syrup being subsequently filtered before being pumped to the mixing tank. A syrup of 45° Twaddell (made by dissolving 6 lb. 0½ oz. of sugar in 5 pints of water for each gallon of syrup) is usually prepared as a stock syrup, but this may be varied according to the nature of the drink prepared. To this, citric acid is added at the rate of about 2 to 3 oz. per gallon of syrup, depending again on the nature of the product. After checking the density, and correcting if necessary, the filtered syrup is then pumped to a glass-lined or other suitable mixing tank. When the amount required for a run has been

**The illustration at the top of the page shows the lay-out of a modern bottling department for mineral waters. With acknowledgments to Bratby and Hinchliffe, Ltd.**

pumped in, the colour is then added. No useful purpose would be served by giving tables of colours and quantities to be used for various drinks, since most manufacturers have their own ideas as to tint and depth of colour. Any of the well-known food colour manufacturers are always ready to help with suggestions, but it should be ascertained that all colours used are amongst those permitted by the Government.

## Use of Colours

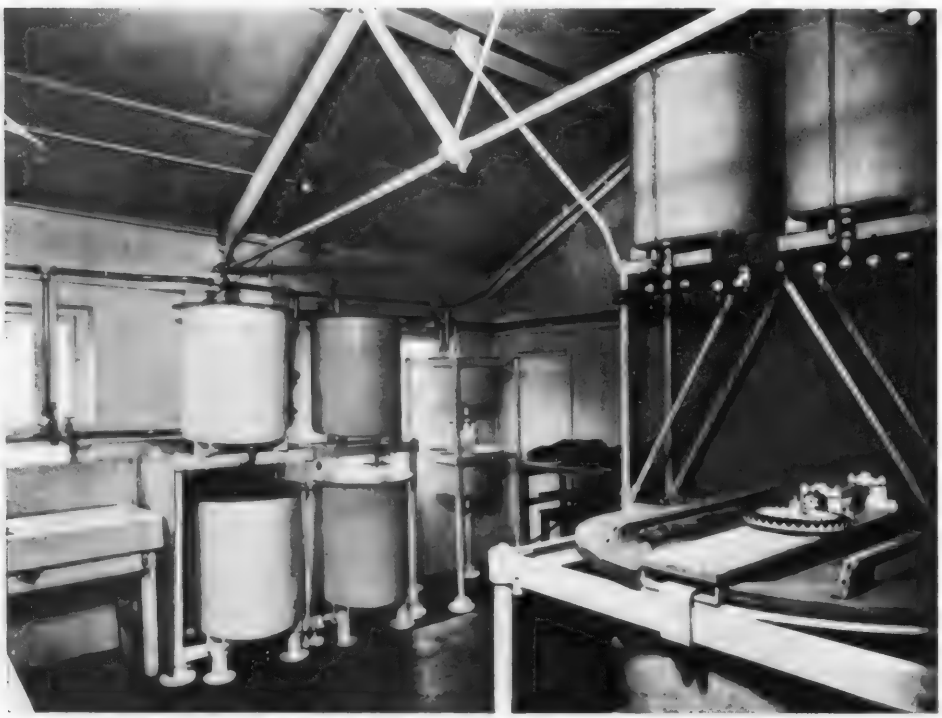
Food colours, particularly for the smaller manufacturer, are best added to the syrup in the form of a concentrated solution, say 5 per cent., in water. This makes the quantity to be added to each batch a reasonable amount to measure, and also gives a greater uniformity. Many such colour solutions, however, do not keep well, and unless preserved with a preservative solution, may be a serious source of contamination. If large batches of syrup are being made, and it is desired to use a solid colour, this is best first mixed into a paste with a little of the syrup, and then finally poured into the main bulk. Another point to watch is that the colours used should be stable towards acid and to light. Lemonade, for instance, coloured with Sudan I may appear to be quite satisfactory from the point of view of colour when first made, but on standing, the tint will change to bright pink, due to the acidity of the liquid. Tartrazine, on the other hand, is stable under the same conditions, and will retain its yellow colour.

## Types of Flavouring

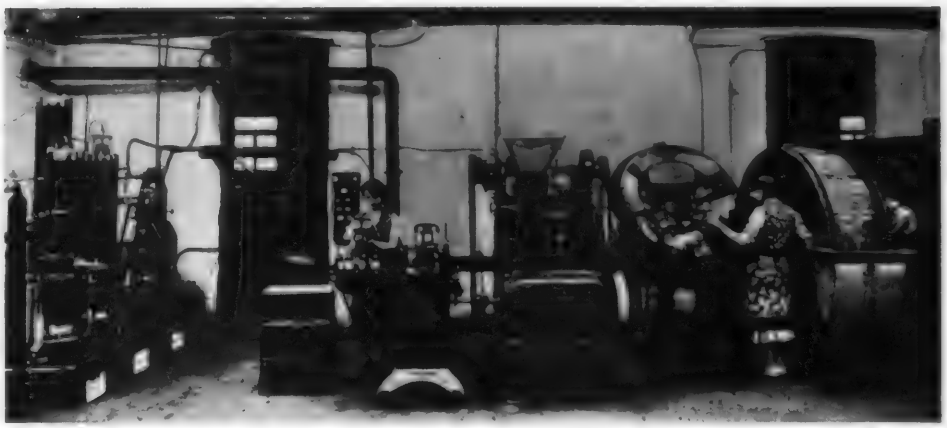
The flavouring of mineral waters is a very expert matter, and unless manufacturers can afford the services of such a person, it is often better to purchase ready-made essences from reputable houses. In an article of this description, it appears to be impossible to deal in any detail with such a wide subject, but it should be understood that there are three main types of flavouring to be considered.

First, there is the method of using fruit juices entirely, and these may either be purchased in the form of clear concentrated syrups or, in some cases (as, for example, with grapefruit), they may be cloudy and even contain fruit cells. This is obviously the most desirable way of flavouring mineral waters, but partly on account of cost, and partly on account of the demand of consumers for drinks with more "kick" than can be obtained by such means, many manufacturers use a proportion of pure fruit flavour, together with a suitable soluble essence, which may be entirely synthetic or which may consist of a fruit oil base with synthetics added. Certain drinks, and perhaps grapefruit is one of the most prominent, necessarily require a certain amount of such added flavouring, and without them they would be insipid and unpalatable. The third type of flavouring referred to above consists entirely of a mixture of fruit oils and synthetics, or synthetics alone, without any actual fruit juice at all. Such flavours are cheap, and often very strong, but they are lacking in "body" and are often not true to the name on the bottle. Judging by the number of court cases arising out of this flavouring question of mineral waters, fruit syrups, etc., manufacturers would do well to ascertain which of these three groups of flavouring material they are buying, before labelling their bottles.

The mixing tank, in which the sugar syrup is mixed with the colouring and flavouring materials, should be a



**A typical Syrup Room Layout, showing Measuring Tanks, Syrup-making Tanks, and Mixer. (With acknowledgments to Barnett and Foster Ltd.)**



A typical Mineral Water Bottling Plant. The Carbonator is shown on the extreme left, and the Bottle Washer on the right. (With acknowledgments to Barnett and Foster, Ltd.)

covered tank fitted with a bottom outlet and rousing gear, either in the side near the bottom, or actually in the bottom of the pan. This will ensure good circulation of the liquid without any aeration. In practice, with a large or even medium sized factory, several mixing tanks are found to be a necessity, not only so that different flavoured mineral waters may be bottled at the same time, but also in order to keep the syrup-making plant in continuous operation. A typical syrup making and mixing room is shown in the photograph on the opposite page.

## Bottling

The syrup, made according to standard formula, is fed through a pipe line to the bottling machine, and the requisite quantity—usually 1½ or 2 fl. oz. per 10-oz. bottle—is delivered into each bottle. In early machines this was a separate operation, but with modern machines this is done simultaneously with the addition of aerated water. The history of carbonated water for use in the mineral water trade is very long, and begins with the use of some very primitive apparatus. To-day, although there are still in existence a few carbonating plants which rely on the action of acid (either sulphuric or hydrochloric) on marble, or whiting, most of the carbon dioxide used for the mineral water trade is in the form of liquid contained in cylinders. This is much more convenient from the point of view of space occupied, and obviates the necessity of having dangerous acids, like sulphuric and hydrochloric, on the premises.

For certain liquids—*e.g.*, beer and cider—it is preferable to carbonate in tanks by leaving a chilled liquid in contact with the carbon dioxide gas under pressure, and then pumping to the bottling plant. For mineral waters, however, the most convenient and most universally used method is the continuous process, whereby carbon dioxide gas from cylinders and chilled water are mixed together under pressure, and agitated to saturate the liquid with the gas. It is, of course, important that the water should be thoroughly chilled before the gas is mixed with it, since the solubility of carbon dioxide in water decreases rapidly with increase in temperature. It is usual to chill the water to 40° F., and this is best done by the use of a carbon dioxide refrigerating plant. The water is usually carbonated to about 70 to 80 lb. per square inch pressure, and a continuous supply of this is passed into the bottling machines by means of a pump. It might be expected that there would be considerable loss in pressure between the time that the bottle is filled and the closing operation, but actually this is not so. Agitation causes a considerable loss of gas, and this is avoided in modern filling machines by producing counter pressure in the bottles, with the result that the carbonated water and the fruit syrup pass into the bottle quietly and without any splash. There is invariably a small loss in pressure during this transfer from the supply tank to the bottle, and during the period in which the bottle remains uncapped, but allowance can easily be made for this. Well carbonated water, say at 80 lb. initial pressure, should show approximately 70 lb. per square inch in the finished bottle, and this should be checked by pressure gauge periodically throughout the day; also, the final specific gravity, acidity, colour, and flavour should be tested.

## Capping

There are many forms of closures which may be used for mineral waters, ranging from the old glass ball type to "crown" cork stoppers, and, finally, syphons. Whichever method is used, the closing should be effected as quickly as possible after filling, not only so that the loss of gas may be reduced to a minimum, but also so that infection by micro-organisms might not take place. The type of closure to be used must remain a matter for individual choice, but some form of automatic closing is desirable, since it is quick and will keep uniform pace with the filling machine.

## Some Common Faults

Before continuous carbonating machines became popular, there was great irregularity in the gassing which occurred when the bottle was opened. Some bottles gave a small release pressure and the liquid continued to bubble for 5 to 10 minutes, whilst others would vigorously effervesce momentarily and leave the liquid almost flat. Excessive pressure in the bottle will cause this vigorous effervescence, and this in turn causes agitation of the liquid. Agitation causes dissolution of the gas,

A selection of "Pfaudler" Glass-lined equipment at the Direct Supply Aerated Water Co. Ltd., London.

and the liquid therefore becomes flat. With a moderate pressure of say 80 lb., the release of pressure on removing the stopper is not sufficient to cause agitation, with the result that the gas is not lost immediately from the liquid, which consequently will sparkle for some time. In a similar way a "quiet" syphon of soda water is very much better, and actually will leave far more gas in the glass than a vigorous syphon, which may, at first sight, be thought to be in splendid condition. As regards pressure, therefore, moderation should be the policy.

On storage, it sometimes happens that a deposit is thrown down in the bottle. This is usually caused either through the use of hard water or to the growth of micro-organisms. If it is the former, the deposit is usually not only on the bottom of the bottle, but also forms on the sides as a haze. Under the microscope this haze will be seen to consist of small crystals of calcium salts. Sediments, due to bacteria and yeasts, are invariably at the bottom of the bottle, and often produce, in addition, a general haze in the liquid. Microscopic examination of the sediment will show whether or not the trouble is due to this cause. General cleanliness of the factory, and particularly of the syrup-making equipment, bottling plant, and the bottles themselves, are important points to watch in order to avoid contamination. All bottles should be washed well with a good detergent, and in the case of hand machines, the water should be changed very frequently. If natural fruit juice is being used, this may easily be the culprit, and each cask or jar should be examined for active organisms before it is used. Occasionally slimy growths are to be found in mineral waters. These are very similar to the "mother of vinegar" which forms on malt vinegar sometimes. Actually the two are very similar, and are due to the activities of certain bacteria. The main difference is that "mother of vinegar" organisms can only grow in the presence of air, whereas the organisms which cause slimy masses to form in lemonades, etc., can only grow in the absence of air. Carbonated beverages, therefore, afford an excellent medium for their development, and they can be very troublesome when once found in the factory, since they are very resistant to sterilisation.

In connection with spoilage of mineral waters, a word may be added regarding the presence of preservatives. If clean materials have been used, and the cheaper form of product (that is, containing no, or very little, fruit juice) is being prepared, the carbonation and pressure make the development of the majority of organisms very improbable, and such beverages should not require any preservative in order to keep them in sound condition almost indefinitely; in fact, the law does not provide for any preservative whatsoever to be used with such drinks.

With fruit juices, however, although again if the process and material are above suspicion there is very little risk of trouble, sulphur dioxide may be present. The amount, however, must not exceed that which is permitted by law to be present in the fruit juice ingredient of the product. For example, if a black currant drink contained 5 per cent. of black currant juice, the amount of sulphur dioxide which would be permitted in the final drink would be 5 per cent. of 1,500 parts per million, or 75 parts per million, since black currant juice may itself be preserved with 1,500 parts per million of sulphur dioxide. No other preservatives are permitted, and actually they are not necessary.

## VITAMIN C from STARCH

A COMMUNICATION appears in the *Berichte* of the German Chemical Society by the Chinese investigator, Dr. P. P. T. Sah, in which the "synthesis" of ascorbic acid (vitamin C) from starch is claimed to have been effected. It was done by submitting the starch to a series of oxidation, reduction, and dehydration processes. When starch is oxidised carefully it gives saccharic acid; this was reduced to gulonic acid, dehydrated, and further reduced to the sugar gulose. From the penylhydrazone of this substance ascorbic acid was derived by further treatment.

Since so complex a body as starch is used as the starting point, it is hardly accurate to describe such a production of ascorbic acid as a synthesis. Nevertheless, this discovery is of considerable interest and importance. Not only does it suggest a method adopted in nature for the production of the anti-scorbutic vitamin, but it may also lead to a cheap source of this vital accessory food factor being made available.

Vitamin C is, of course, the water-soluble vitamin present in citrus fruits and to a less extent in apples, tomatoes, spinach, paprika, etc. Its chemical nature was established a few years ago by Professor Szent-Gyorgyi, who obtained quantities of it from Hungarian paprika.

# COSTING in the Jam and Allied Industries

## The Second and Concluding Part of the Article by F. S. WILSON, A.C.W.A., F.R.Econ.S.

### Production Planning

APART FROM fresh fruit which is purchased for immediate requirements, all materials when purchased should be debited to a stores account and only issued to the manufacturing departments on the written authority of an independent responsible person. If the business is large enough it should have a production planning department, who would be responsible for passing all requisitions drawn upon the stores, but if the business is a small one the authority would rest with the departmental foreman or manager.

The stores requisitions should be priced, valued, and analysed by the cost department so that the stores may be credited and the consuming departments debited with usages. When the planning office is responsible for signing stores requisitions it does so with a knowledge of the quantity of materials which are required to fulfil the production orders; therefore, if the departments do not obtain the predetermined outputs from given quantities of raw and packing materials, the management can spot excessive waste straight away.

The installation of a stores system can, like most things, be over or under done, but its main purpose is control. In a small factory it may be uneconomical to keep a detailed track of colours, acids, labels, and very small articles, but in a large one a much closer check is possible without excessive cost. The one thing to guard against is an excessive cost of reducing costs.

### Labour and Wages

Labour must be recorded in such a manner that the cost of any and every operation is easily obtainable. There are several well-known methods of payment, but the most popular ones are (*a*) a bonus system; (*b*) a straight piece-rate system; and, lastly, (*c*) the old-fashioned system of hourly payments. It is not the intention of this paper to deal with the various merits and demerits of each system, but it is suggested that the least efficient and effective system is the method of payments at hourly rates. At the same time a wage incentive method of payment which does not counterbalance the worker's natural desire to produce quantity at the expense of quality must be deprecated. The larger firms would be very wise to employ an efficiency engineer or a person skilled in labour study, because such specialists can undoubtedly save enormous sums of money by eliminating wasteful production methods and employing the most suitable personnel for each operation.

Labour costs can be reduced if skilled labour is always available, rather than have to employ unskilled labour year after year, and it should be the management's endeavour to find regular employment for its workers throughout all seasons if possible. This result can be achieved with much success if products other than jam are produced at different times of the year. Marmalade, mincemeat, jellies, canned and bottled fruits all have their different seasons, and most, if not all, of these products are manufactured by those firms who manufacture jams.

### Idle Machinery

The overhead expenses form a very large item of expense, particularly in the larger factories, where machinery predominates the manual labour employed, and it must be remembered that idle plant and machinery which is not occupied to capacity is a positive loss to the company. It is realised, of course, that no mechanical equipment in a jam factory can work at 100 per cent. efficiency for any length of time, but it is not too much to expect 80 to 85 per cent. or even 90 per cent. efficiency if proper care and supervision is exercised in running and maintaining it. Not many jam manufacturers obtain sufficient orders to keep their plant and machinery employed at capacities anywhere approaching these percentages, so that it appears that the industry is also suffering from too much competition—*i.e.*, there are too many manufacturers attempting to supply the present demands. The remedy is, unfortunately, outside the scope of this paper, but it should be pointed out that if every manufacturer knew his real costs of production many of them would realise more fully the present state of the industry and leave the way clear to more healthy competition amongst the economic units.

Although many of the variable overhead expenses cannot be predetermined in the same manner as the buyer knows the future price of materials, they can be controlled to a large extent by efficient management. For example, the planning office can save the firm much money if long production runs are made instead of small runs, with the consequent lost time in production and the cost of cleansing the plant and utensils. Repairs to machinery can be reduced if they are systematically oiled and examined.

### Transport, Power, Water, etc.

Internal transport can probably be reduced by a regrouping of certain departments. Power should be switched off immediately machinery is not working, and many other points watched for possible saving in overhead expenses. It is of little use to know at the end of a financial period that the cost of power per unit of output has increased over the previous period; the staff should be trained to think in terms of £.s.d. and to save money for the firm by realising that it is for their own benefit that costs should be reduced. If the factory is large

enough to justify the expense, meters should be installed in each department, so that accurate records of the amount of water, power, etc., are available, otherwise the chief engineer, in consultation with the cost accountant, should allocate these charges to departments on some other logical bases.

### Method of Recovering Costs

Having departmentalised every item of expense to the appropriate departments, the method of recovering them in the costs of each line manufactured must be considered. It will be found that no one method of recovery is practicable for all departments—*e.g.*, the overheads in the jam boiling department can most accurately be recovered on all jams boiled at a common cost per cwt. of jam produced, or cost per boil, whereas the overheads in the labelling department would be recovered as a common cost per jar labelled, whether the jar contained 1 lb. or 2 lb. of jam. Each department must therefore receive careful consideration so that the overheads are charged to the products on the most accurate bases possible. The factory cost of each line is now available, and only distribution and selling expenses have to be added to arrive at the total costs. If the cost of distribution for the period is divided by the total tonnage of goods despatched, the cost per cwt. for this operation is found. This is added to the factory cost at a flat rate per cwt., as the cost varies directly with the volume of goods despatched.

Selling expenses, on the other hand, vary to some extent with turnover, and should be charged to the costs as a percentage on the net selling price. It should be remembered, however, that some of the selling expenses do not vary with the turnover, and when estimating for additional business this factor should be borne in mind, together with the fixed factory overheads.

### The Buying Dept.

In addition to its primary functions, the cost office can be used to great advantage in many other important directions. For example, the methods of buying must be considered from all angles—whether long-term contracts should be entered into with the fruit suppliers or if seasonal contracts should be made. The question of buying foreign fruit must not be overlooked, particularly strawberries from Holland, which produce a much better jam than most of the English-grown strawberries (the Wisbech district growers appear to be tackling this problem at the moment). If the manufacturer is selling pulp-made jams, he must determine from a cost point of view whether he shall buy the fresh fruit and pulp it himself or if he shall buy the fruit already pulped. The cost and selling value of pulp casks must not be overlooked in the comparative costs.

The largest ingredient—sugar—is one on which money can easily be lost unless a very careful study is constantly made of the trend of market prices, and a good buyer can make excellent contracts for his firm. If the bulk of the trade is in the home market, it may, of course, be preferable to buy home-grown beet sugar, but for export purposes it may be cheaper to use foreign sugar, owing to the higher rate of drawback which is obtainable.

Packing cases are an expensive item of cost, and it may pay the larger jam manufacturers to make their own wood and/or fiberite cases unless they are favourably situated near such box manufacturers, in which case a satisfactory arrangement regarding prices can probably be determined to their mutual advantage.

Alternative methods of distribution must be considered—should the manufacturer deliver direct to customers or should regional depots form an integral part of the firm's service? Should the travellers concentrate upon wholesalers or retailers or both?

Alternative methods of manufacture—machine work *versus* hand work, mass production as opposed to producing for individual orders, the seasonal production of fresh fruit jams or pulp-made jams made throughout the whole of the year—must be considered from the profit angle. These questions and many others can be settled according to the facts derived from the cost accounts.

## The IODINE CONTENT of FOODS

BALKS (*Zeitschr. für Untersuchung der Lebensmittel*, 1936, **71**, 76-93) has carried out tests on the iodine take-up of vegetables, in which it was found that the iodine contained in potatoes, white cabbage, and carrots had no connection with the iodine content of the soil in which they were grown. The iodine take-up of spinach was high for all soils and was in proportion to the natural iodine content of the ground. The iodine content of spinach was markedly increased by iodine manuring.

The iodine contents of milk and water from various districts were also investigated.

## Professor Rideal's Paper

THE paper on "Food Problems and Surface Chemistry" to be read on June 27 at the Cambridge meeting of the Food Group is by Professor R. K. Rideal and not Riddell as was stated on page 168 of our May number.

## Colours for Food Wrappings

ACCORDING to a report issued by the U.S. Department of Agriculture, black and chlorophyll green are the most satisfactory colours for the wrappings of oil-bearing foods, being the most active in the resistance of food spoilage; blue colouring is said actually to encourage damage of the product.

# The CHOICE of FLAVOURING MATERIALS

By Lionel J. Dent, B.Sc., A.I.C.

IT IS generally recognised that in manufactured foodstuffs, given basic materials of sound standard quality and effective presentation, the most important factor in the popularity and continued sale of the product is its palate appeal or eating quality—in short, its flavour. The choice of flavour to be used in any given case is therefore of paramount importance, and this choice is governed by a wide range of factors which must be studied with the utmost care. From the flavour point of view, then, these factors may be considered under three headings: (1) Market requirements; (2) the cost factor; (3) the type of product.

It will be sufficient to sketch out roughly the scope of the first two considerations before going on to a more detailed study of the last, which, after all, is of more direct interest to the practical man.

## Market Requirements

The main point here is dependence upon the palate of the consumer. Men, women or children, as potential purchasers, each have their particular tastes which are quite definite even if not well defined. Men will lean towards the drier types of flavour, such as grapefruit, plain chocolate, ginger, walnut, and so on. Women generally favour the very delicate flavours; whilst children, although quickly nauseated by powerful flavours with the slightest trace of a "chemical" note, can relish what to grown-up tastes would be much too sweet or "sickly".

Tastes in various parts of the country differ, too, owing probably more to usage than to any actual palate differences; it is, nevertheless, very marked, and products which appeal to a class of consumer in, say, a mining area, will not appeal to the parallel stratum in London, and vice versa.

Here, then, it is necessary to decide whether to market on the lines already laid down by competitors or whether to educate the prospective buyer to a new taste, a process often requiring much time and money.

## The Cost Factor

Having decided what market is to be catered for and whether the appeal is to be made upon a quality or price basis, there will be a definite margin of cost available for flavouring the product, and evidently this allocation will be fundamental in deciding the type of flavour to be used. It does not, however, follow that the most expensive flavour is necessarily the most suitable for any given job, nor, as has already been suggested, that a high flavour concentration necessarily means a more popular article.

While it is generally agreed that the natural products —fruit juices, etc.—give the best flavours, the science of blending synthetic and partly synthetic essences has so developed during the last few years that a first-rate flavouring result can now be produced by this means when the cost of using natural extracts would be prohibitive.

## The Type of Product

The kind of *flavour* required, and its strength and cost having been decided, it is necessary to determine the type of *essence* which will give the results required. Technical difficulties may now arise. And this fact is reflected in the conservative attitude of most food manufacturers towards new flavouring materials. Once they have found an essence to answer their purpose in every way they will stick to it, in spite of demonstrations of large savings, with a tenacity which seems to be born of bitter experience. There is, indeed, the right type of essence for every job, and this sad state of affairs is invariably the result of using essences, ordered without reference to their purpose, which are intended for quite a different use. The importance of expert choice of flavouring materials cannot be over-emphasised, and small manufacturers would be well advised to put their difficulties directly before a reputable essence house.

For example, in order to obtain crystal-clear results in the mineral water trade, essences of the highest quality, specially manufactured, are required, and satisfactory results will be obtained with no others; conversely, for cloudy drinks, a cheaper essence can be used with equal or even greater satisfaction, if used correctly. Again, the best results for sugar boiling are probably obtained by essences in an oil base, and the disastrous effects of using such essences in other types of confectionery can well be imagined.

With many products, fully sweetened and containing a balanced proportion of fruit acid, a single simple essence will often give the best results, but for non-acidic bases it will usually be found that a backing of flavour of the vanilla, almond, rose, or peach type, depending upon the flavour type required, will very materially assist in giving the palate fullness required.

## Keeping Properties

Finally, the keeping properties of the essences must be considered. To discover a much cheaper essence, only to find that over a period of a few months or even weeks no appreciable flavour remains, has been the fate of many a confectioner. This particularly applies to powdered goods, and here, again, a special type of essence should be selected in order to obtain the best results.

Marked improvements in the blending and manufacture of essences have taken place of recent years, and it would benefit each manufacturer to examine his products in the light of these advances. Increased palate appeal means increased sales, but unless the services of an expert are available it will always pay to consult the essence maker.

# INDUSTRIAL NEWS

### Imperial Fruit Show and Canners' Exhibition

Details of the exhibits and competitive classes are now available to intending entrants to the Imperial Fruit Show and Canners' Exhibition to be held at the Renshaw Hall, Liverpool, from October 30 to November 7. The closing date for entries for the United Kingdom is September 12 (London), for Australia August 22 (Melbourne), for Canada September 12 (Ottawa), and South Africa August 22 (Pretoria).

### India Sugar Research Institute

The Sugar Section of Harcourt Butler Technological Institute, Cawnpore, has now been transferred to the Government of India, who are converting it into an All-India Sugar Research Institute where intensive research work will be carried out to develop and establish the Indian sugar industry on modern scientific lines. It is intended to staff the Institute with highly qualified men from abroad.

### Mobile Milk Bars

A mobile milk bar, equipped with dry ice refrigeration and milk pumps, has been designed by the Milk Marketing Board in collaboration with the Ministry of Health for sale to producer retailers, and dairymen. The Milk Board hopes that at least 1,000 mobile bars will have been placed by the end of the summer and that another 1,000 shop bars will be established this year. The Board have a department which assists private firms to select sites for bars and advises on equipment and on the mixing and serving of the drinks.

### Silk Screen Printing Exhibition

The Association of Display Producers and Silk Screen Printers have arranged the exhibition of Silk Screen Printing in the Italian Room of the First Avenue Hotel, London, on June 9, 10, and 11. Exhibits of leading producers of Silk Screen work and well-known materials and equipment by suppliers, will be displayed and demonstrated.

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Mr. Geoffrey K. Peto has been appointed a member of the Wheat Commission, representing the interests of consumers of flour.

Dr. Leslie H. Lampitt, Chief of the Laboratories of J. Lyons and Co., Ltd., who was appointed to the Board of Directors on April 21.

### Citrus Fruits in the Soviet Union

Important increase is being made in the area under citrus fruits (oranges, tangerines, grapefruit, and lemons) in the Soviet Union. The experiment of introducing American grapefruit into Georgia, Transcaucasia, has proved successful, and in 1935 the crop amounted to 400 grapefruits, while this year's crop is estimated at 15,000.

In 1932 the total crop of tangerines only amounted to 12,837,000, but in 1935 it exceeded 220 millions, of which 30 millions were consumed by the local population in Georgia and 190 millions were put on the market.

The present area under citrus fruit of 8,000 acres is to be increased by the year 1940 to 50,000 acres and the additional 42,000 acres will all be planted in Georgia.

### Iodised Fruit Wrappings

Experiments recently concluded by Mr. R. G. Tomkins at the Low Temperature Research Station, Cambridge, show that the fungal rotting of fruit in storage can be considerably reduced by wrapping or packing the fruit in paper impregnated with suitable amounts of iodine.

Tests on a larger scale are planned to confirm and extend the results obtained in the laboratory, while investigations are now in progress to ascertain the degree to which iodine is absorbed by the fruit.

The question of compliance with the Public Health (Preservatives, etc., in Food) Regulations will require consideration at this stage.

### Dr. Lampitt, Director of Lyons

Dr. Leslie H. Lampitt, D.Sc., M.I.Chem.E., chief chemist of J. Lyons and Co., Ltd., was on Tuesday, April 21, appointed to the Board of Directors of the company.

Dr. Lampitt studied at Birmingham University from 1906 to 1911 and gained a double honours in Chemistry and the Chemistry of Fermentation. From 1911 to 1914 he was chemist to the largest flour mills in Belgium and during the war served in France and Belgium from 1914 to 1918.

In June, 1919, he took charge of Lyons laboratories, with one assistant and a clerk. He now has a staff of 150 under him carrying out analytical and important research work.

Dr. Lampitt is Vice-President of the Society of Public Analysts, a member of the Council of the Institute of Chemistry, Hon. Treasurer of the Society of Chemical Industry, Chairman of the Food Group of the Society of Chemical Industry, member of the Chemical Council, and a member of the Food Investigation Board (appointed by the Government).

Dr. Lampitt is well known as the author of many scientific and technical papers, and has lectured in many parts of the world.

### New Butter Factory in Cornwall

The construction of a large butter factory for the Milk Marketing Board is to begin immediately at Camborne, Cornwall. The factory will be capable of dealing with about 12,000 gallons of milk daily, giving an initial output of about 45 cwt. of butter per day.

The Board's other factory at Helston will be retained as a separating unit, and the cream will be taken from there to the Camborne factory.

The new factory will be one of the most modern in the country, and will be a link in the chain of butter factories which the Board is seeking to establish throughout the country. It is hoped to open the factory by October 1.

### Liverpool Biscuit Factory

Additions are to be made to the biscuit factory in Dryden Road, Liverpool, for Wm. Crawford and Sons, Ltd., Fairfield Biscuit Works, Liverpool, 7.

## A New Bread Plant

A report from Moscow states that ordinary wheat has been crossed with a perennial called Quequena grass. Flour made from the corn of this hybrid is said to be of very high quality, and the bread obtained from it is superior to that made with ordinary flour. The new bread has a finer texture, is softer and of better taste and odour than ordinary bread. Moreover, from equal weights of the grains there is a greater yield of flour. As the hybrid is a perennial, one sowing should suffice for a number of years, so that this discovery may be of considerable economic significance.

## New Milk Factory

As a result of increased demand for milk chocolate, Cadbury Bros., Ltd., have purchased a site at Marlbrook, in the county of Hereford, upon which a milk condensing factory will be erected.

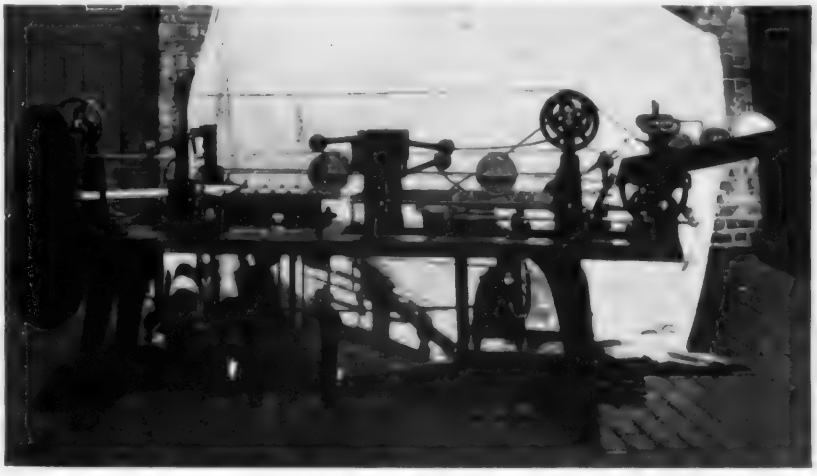
## "Romos" Preservative

This preservative is a white powder, based on the methyl ester of parahydrobenzoic acid, and is made by M.R. Chemical Products, Ltd. It is readily soluble in boiling water, the resulting solution being applied in the usual manner for such preparations. Generally speaking, not more than 0·1 to 0·25 per cent. of the total quantity to be preserved is required. The preservative is applied in the manufacture of preparations such as drug decoctions, creams, emulsions, hydrogen peroxide, glycerine jelly, and almond milk.

All that remained of the Glidden Company's Soya Bean Processing Plant in Chicago after the explosion last year, in which eleven men were killed, forty-five were injured and property valued at $600,000 was destroyed.

## The Liverpool Refrigeration Co., Ltd.

Orders recently received by the Liverpool Refrigeration Co., Ltd., include an electrically driven ammonia refrigerating plant for caustic solution and water cooling, including a "Polar" sleeve valve compressor. A similar plant for milk cooling and storage has also been ordered by a dairy company. Numerous orders have been placed for supplying refrigerating machinery to ships.



A new labelling machine introduced to the market by the Beth Label and Wrapper Machines, Ltd. This machine is similar to their Adjustable Labelling Machine, with the exception that it is considerably larger and is, therefore, capable of dealing with outsize tins.

## Hewitt's Taring Scales

Taring Scales made by A. H. Hewitt, Worksop, Notts, England, are used extensively in the food industry for jams and marmalade, biscuits and cakes, chocolates and confectionery, tea and coffee, essences and colours, etc.

The scale has two dials, the one showing the tare point being movable by means of a lever. The container is placed on the scale and the dial finger moves to the weight of the container on the unmovable dial. By means of the lever the tare point is moved to the dial finger. The container can then be filled to any net weight required as shown on the movable dial and the unmovable dial shows the gross weight.

Scales of this type have saved the jam trade lifting millions of tons annually. The 14-lb. scale is used mostly for filling sevens and saves the filler lifting 12½ tons a day.

## Millwall Flour Mills

Plans have been prepared for a further important scheme of extensions, at the Wheatsheaf Mills, Millwall Docks, E. 14, for McDougalls, Ltd., flour manufacturers. It is understood that a new building of ferro-concrete construction, to be used as a packeting warehouse, is to be erected.

## A Laboratory Mixer

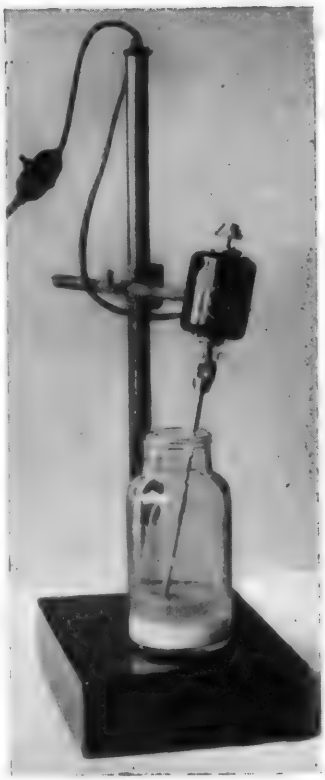
An electrically driven laboratory mixer, made by L. A. Mitchell, Ltd., works by means of the high-speed revolution of a small propeller. This type of agitation is widely applied to the chemical, pharmaceutical, and allied industries. The machine shown has a motor of 1/60 h.p., and is arranged with a variable speed control so that a wide variation can be obtained from 4,000 r.p.m. down to practically nil. The motor is totally enclosed, and the unit can be clamped at any desired position on the stand. The propeller and shaft are of stainless steel. These units are arranged for standard A.C. and D.C. 200-240 volts.

## Smith's Time Recorder

A new style of recorder for factories and other concerns has been introduced by Smith's English Clocks, Ltd., Cricklewood, London, N.W. 2, evolving the application of the synchronous motor clock to the time recorder. Automatic action has reached such a stage in the new time recorder that, apart from the putting in and taking out of the worker's card and depressing of the lever, nothing remains to be done by hand or by any special attendant.

The continuously running clock is reponsible for all the necessary changing as the days run their course through the week. There is an entirely automatic card adjustment by which "out" recordings may be made immediately following on an "in" register, while the patent punch mechanism ensures that intentional or unintentional faulty or double recordings are impossible. By means of an automatic device late arrivals, early departures, overtime, and other irregularities are recorded in red.

Smith's fully automatic time recorder, which is described above.



Laboratory Stirrer made by L. A. Mitchell, Ltd., a note on which appears on this page.

## Food Research

We have recently received a copy of the first issue of *Food Research*, a new American bi-monthly journal devoted to the publication of the results of original investigations in the fields of food and beverage technology, chemistry, and microbiology. It is published by the Twin City Printing Co., Champaign, Illinois, U.S.A., and the annual subscription is $4.00 domestic and $4.50 foreign.

The first issue contains papers on Vitamin C Content of Vegetables—I. Spinach, The Preservation of Grape Juice, Studies of Numbers and Types of Micro-organisms in Frozen Vegetables and Fruits, Vacuum Determination in All-Glass Canning Jars, Microbiological Examination of Dried Foods, Some Observations on the Freezing Preservation of Alderman Peas, The Cause of "Black Beets", Microbiology of Merchantable Cream-Style Canned Corn.

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Jack L. Barnett, Ltd., bottle and glassware manufacturers of Leeds, removed on May 6 from Basingball Street to larger premises at 6, Meadow Lane, Leeds.

## Metal Closures New Development

Metal Closures, Ltd., West Bromwich, Staffordshire, have now taken over the activities previously handled by the Bottle Closure Division of the Northern Aluminium Co., Ltd.

The new company will continue to accord to all users of closures the benefit of their technical knowledge so far as the use and application of suitable liners for all types of products are concerned.

## New Trichromatic Colorimeter

A simple instrument for the measurement of any colour, embodying patented features, and suitable for opaque or transparent samples of any material, has been devised by Adam Hilger, Ltd. The instrument has the advantage that instead of three adjusting knobs only one is necessary for the variation of the matching colour, increased facility in operation resulting. The colorimeter is compact, occupies but little space, and is suitable for operation directly from either A.C. or D.C. electric supplies.

## New Machine for Handling Grain by Suction

A new machine for the pneumatic transport of grain, handling 4-5 tons of grain per hour with a transport distance of about 180 feet, has been developed. The machine consists essentially of a pump which sucks up the grain into a cylindrical tank, and then discharges it by air pressure at the bottom of the same tank. The machine is mounted on wheels and can be easily moved from place to place.

The machine for handling grain by suction, a note on which appears above.

# BOOK REVIEWS

## Chemical Plant Design

The McGraw-Hill Publishing Company Ltd. is to be congratulated on a further addition to its Chemical Engineering Series. There are now available amongst its publications authoritative works dealing with most of the important branches of chemical engineering and including such standard treatises as Walker, Lewis and McAdams' *Principles of Chemical Engineering*, Badger and McCabe's *Elements of Chemical Engineering*, and supplementary volumes on Industrial Stoichiometry, Electrochemistry, Economics, and Costing and Accounting.

To English readers the title of the present work may be somewhat misleading. Dr. Vilbrandt subdivides chemical engineering design into equipment and plant design and defines the latter as " an analysis of the fundamental principles and factors that are involved in the development of a technically and economically efficient plant process from the laboratory stage through the pilot plant stages to the commercial size unit ". The subject matter included within this definition is varied, and the author has shown considerable skill in selection and arrangement so as to avoid overlapping on the one hand and the introduction of irrelevant material on the other.

The chemical engineering student will find Chapters I and II dealing with the Plan of Attack and the Development of the Design Project particularly valuable. Considerable stress is laid upon the importance of preparing at the very outset a concise statement of the project embodying all the known facts; and of deciding what experiments may be necessary to obtain full information on the technical side of the problem in hand.

The succeeding five chapters deal with the Location of the Plant and such questions as Foundations, Drainage, Piping Installation and Pumping. The fundamental principles dealt with in this section are clearly set forth and are of general application, although some allowance must be made for certain differences in English and American practice due to climatic and other causes. In this connection it may be mentioned that the design, erection and operation of factories in this country are affected by statutory obligations with which the chemical engineer must be familiar; and for his information an " Index to Acts of Parliament and Statutory Rules and Orders Affecting the Chemical Industry " has been issued by the Association of British Chemical Manufacturers and is kept up to date by periodic supplements.

Chapter VIII contains an account of the preparation and use of qualitative and quantitative Flow Diagrams. Several examples are given of typical diagrams, and a project for the recovery of ferrous sulphate contained in waste pickling liquors is worked out in detail from laboratory and semi-works data. The problem is well chosen as including such unit operations as filtering, evaporating, crystallising, centrifuging, and drying; each stage is dealt with separately, and the student will find no difficulty in following the calculations step to step. Preconstruction data costs for the project are given in an appendix.

The remaining chapters include the selection of Process Equipment, Plant Layout, Buildings, Power Transmission and Preconstruction Cost Accounting; these aspects of the subject are treated generally; but the student will find that all the important factors concerned are brought into prominence and useful bibliographies are given which will enable him adequately to supplement his reading.

A number of exercises, including elementary problems and complete projects, are given in two appendices.

D. M. N.

*Chemical Engineering Plant Design. By Frank C. Vilbrandt, Ph.D. First Edition. McGraw-Hill Publishing Company, Ltd. 341 pp. 24s.*

## Handbook of Chemical Apparatus

We have received the sixth number of the *Handbuch der Chemisch-technischen Apparate*, a lexicon of chemical apparatus edited by Dr. A. J. Keiser. This number deals with all types of industrial filters and is planned on similar lines to the earlier numbers (letters A to F). The subject of filters is thoroughly described both from the theoretical and practical point of view, and numerous references are made to the literature. We feel that this work, when completed, will be as valuable to the chemical engineer as *Beilstein* is to the organic chemist.

P. R. E. P.

*Handbuch der Chemisch-technischen Apparate. By Dr. A. J. Keiser. Otto Spamer Verlag G.M.B.H. (Leipzig). No. 16. 8.50 R.M.*

## Aluminium in the Chemical and Food Industries

A booklet of this title has been published under the direction of the International Aluminium Bureau and has been edited by a technical committee representing the following companies: The British Aluminium Co., Ltd., Vereinigte Aluminium-Werke, Aluminium Français and Aluminium Industrie A.-G.

The booklet presents a correlation of results obtained by independent research workers, together with the experiences derived from the practical application of the metal. Such a correlation is of the utmost value to users and potential users of aluminium, especially when it is realised that the subject-matter has been edited by leading aluminium companies both at home and abroad.

After a brief introductory chapter on the general properties and uses of aluminium and its alloys, the methods of testing the corrosion resistance of these bodies are reviewed. The principal methods of jointing light metals—viz., seaming, bolting, soldering, welding, and riveting—are described and practical details and suggestions given. In cases where bare aluminium or alloy does not possess sufficient resistance, the ways of protecting the surface are classified—namely, thickening the oxide skin that occurs naturally on these materials, lining with high-purity aluminium or a specially resistant alloy and applying a paint or lacquer. The erection and maintenance of aluminium equipment is described shortly, and a long and most comprehensive chapter on the action of inorganic and organic substances on aluminium is included. Among the substances dealt with are alcohols, fatty acids and their esters, polyhydric alcohols, sugars, and albuminous products. A further chapter contains information on the action of miscellaneous industrial substances. For the food industry the action of substances such as fruit juices, milk, fish, meat, and butter is described. The final chapter is concerned with aluminium plant designed to meet the requirements of various industries, such as canning, the dairy industry, and the manufacture of margarine.

The booklet is extremely well produced and profusely illustrated throughout with photographs of aluminium plant.

P. R. E. P.

*Aluminium in the Chemical and Food Industries. Published under the direction of the International Aluminium Bureau by the British Aluminium Co., Ltd. Pp. 121.*

## Books Received

*Solutions of Electrolytes, by Louis P. Hammett, Ph.D.* Published by the McGraw-Hill Publishing Co., Ltd., pp. 238. Gives the general principles and laws governing the behaviour of solutions of electrolytes and of the descriptive chemistry of ionic substances. The reactions of inorganic qualitative analysis are used to illustrate the properties of electrolytes.

*Salts and their Reactions, by Leonard Dobbin, Ph.D., and John E. Mackenzie, D.Sc.* Published by E. and S. Livingstone, 6th edition, pp. 246. 6s. A course of practical work is described for those preparing for First Examinations of the Universities, the Royal College of Physicians, etc.

# ARCHITECTURE and the FOOD FACTORY

THESE ARE days of increased industrial development. Factories and warehouses are being rebuilt on new sites or extended and adapted on old sites. Perhaps no modern architecture is as expressive of our age as the architecture of industry. In this connection a short time ago we received a book which is worth more than an ordinary review, being interesting and instructive in many ways—*Industrial Architecture*, edited by C. G. Holme and published by The Studio Ltd., of London, and The Studio Publications, of New York.

It is generally assumed that industrial architecture must be practical and not artistic, but, as Mr. L. H. Bucknell points out in his excellent introduction, this is an unfortunate distinction. A building should be both practical and artistic, and what is said about these two sides in the introduction is well substantiated by the 300-odd illustrations which follow. These examples are taken from all over the world! From Austria, Belgium, Canada, Czechoslovakia, England, Germany, Greece, Holland, Hungary, Italy, Japan, Lapland, Norway, Poland, Portugal, Scotland, Sweden, Switzerland, the U.S.A. and Wales!

* * *

To be really "good" a building must satisfy various requirements. Among other things, the site must be suitable for easy transport of raw materials and finished products, transport of workers, and weather conditions. The building must satisfy all the requirements of the material being manufactured or warehoused as efficiently as possible, and this involves much care and attention to detail. It must be neighbourly in outward appearance, fitting into scenery and surroundings. It should also be remembered that industrial buildings are "the shelter of millions of human beings during the most precious and active hours of the day. Light, space, cleanliness, planning in relation to surrounding country or town, are all the more essential in what becomes a demand upon the social conscience."

Intelligent employers will co-operate to the full with their architects and structural engineers in the building of thoroughly efficient constructions. If the personal consideration of the employer for his employees happens to be a minimum, as is still unfortunately sometimes the case, he should realise that there is much evidence to show that maximum efficiency only accompanies a reasonable maximum of comfort for all concerned, other considerations being satisfied.

* * *

Fundamentally the exterior of the building is intimately connected with the requirements of the interior—one is a function of the other. Essential industrial requirements to-day are very different from those of only a short time ago. No longer are architects confined by unassailable and old conventions. As Mr. Bucknell has it so aptly in

A view of the warehouse of the bakery belonging to the German Co-operative Society at Spandau, a suburb of Berlin. The silos are seen projecting at the back of the warehouse. All smoke and dust is kept away from the main courtyard, seen in the illustration. (Architects: Max Taut and Franz Hoffman. Photo: A. Köster.)

The meat warehouse of the Konsum Factories, Sweden. The island of Kvarnholm, in the harbour of Stockholm, is occupied entirely by Konsum's flour mills, grain silos and bakeries. These have been the work of their own architectural staff under the leadership of Eskil Sundahl. (Photo : C. G. Rosenberg.)

his introduction, "The proportions of an aeroplane hangar have no prototype. The entrance to a stadium or similar building requiring space for rapid ingress and egress of thousands of people, bears no relation to the Temple or the Renaissance Palace."

The 180-odd industrial concerns illustrated in *Industrial Architecture* are examples of what has been done by the architect of to-day working with his new and stupendously enlarged outlook. As we think that many of these illustrations will be of interest to our readers, and also as no review of the book would be complete without them, we are including a selection of those connected with the food industry.

* * *

Cleanliness, ample space and even production flow are important considerations in the construction of bakeries. In the bakery built at Spandau, a suburb of Berlin, for the German Co-operative Society, the flour is brought by rail to the other side of the building (see accompanying illustration) and taken straight from the trucks by means of conveyor belts to the warehouses and the silos. The smoke and dust is kept away from the main courtyard on which the main building faces. The building also satisfies the requirements of the machinery installed for baking, packing and dispatching, and the conveyor belts which are used throughout. Ample washing accommodation is provided for the employees, and canteens and welfare services are also available. In this building production has been increased and the running cost decreased, the same output being obtained as in the old building with only a fifth of the staff.

One point of special interest in the bakery of the Oslo Co-operative Society at Loren, Norway, is the open site of the building and the large unbroken surfaces. This has been compensated for by the use of mottled facing bricks. Internal features of hygienic importance are the lavatories accessible from the bakery. These are so arranged that the door cannot be opened again after use until the user has washed his hands!

* * *

Factors which should produce the expected 45 per cent. increase in output in the new Cima Chocolate Factory at Milan, Italy, are the increased efficiency of workers from good light and ventilation, the improved machinery for loading and unloading, and in particular the "drop" principle on which the factory was organised—the raw materials are delivered in small quantities from the warehouses and immediately conveyed to the top floor by high lifts, the processes of manufacture then proceeding by stages from one floor to another until the finished chocolate arrives at ground level ready for packing and dispatch.

One of the most outstanding features of the Shredded Wheat Factory at Welwyn Garden City, Hertfordshire, is the clean and healthy site which is so in keeping with the product. Other requirements very adequately fulfilled are road and rail transport; the frontage faces the L.N.E.R main line, from which sidings branch off to the factory. The conditions before the architects were unusual in that the Canadian parent company knew in advance to the smallest detail what their requirements would be, and although their accuracy eliminated any risk it considerably restricted the architects' imagination. Construction is of reinforced concrete in the mushroom system, as this, it is said, materially reduces cost of frame-

**The Cima Chocolate Factory, Milan, Italy, showing the long range of windows and the projecting towers for vertical communication (lifts and stairs). The walls are cantilevered out from the reinforced concrete framework, making possible this uninterrupted stretch of windows.**

work and assists even distribution of light by eliminating projecting beams from the ceiling. Provision has been made in the existing columns and foundations for the addition of two more storeys, an important emergency for industrial buildings which must yet look complete at all stages. This factory is built in a beautiful part of Hertfordshire, but its noble proportions and clean exterior do not offend.

Among the few other British buildings of interest to the food manufacturer, Spiller's Grain Mills at Cardiff are perhaps the most important. The mill replaces several older and smaller plants and has enabled much more up-to-date machinery and handling methods to replace the older and less efficient apparatus. The grain is taken direct from the boats lying alongside the jetty and, after weighing and screening, it is carried to the top of a high tower, whence it is conveyed into the bins for storage. When required it is drawn off at the bottom and passed to the mill. The silos are constructed of reinforced concrete with walls approximately 6 in. thick, the use of this material being dictated by requirements as to cost and speed of erection. An illustration of the Spiller mills at Avonmouth occurred in page 426 of our Special Machinery Review issue in December last.

In designing the Slaughterhouse Sales Hall at La Villette, Paris, the architect made good use of the large dimensions at his command. The hall is used by two types of merchants—the one selling meat on commission for some provincial farmer who has sent the carcases to Paris, and the other selling direct the carcases just issued from the neighbouring slaughterhouse. The stands are divided up into three sections by means of two long alleys passing from one end of the hall to the other, so that no one position is more favourable than another, as was the case with the old hall. The floors are of asphalt and the walls of smooth cement, the whole building being easily and quickly scrubbed down and washed.

The varied considerations which direct architects and structional engineers in the designing of industrial buildings will be seen from these few examples. In none of these has planning been on the large scale of the Konsum factories; "Konsum" is the Swedish equivalent of the co-operative wholesale societies of other countries. The island of Kvarnholm in the harbour of Stockholm is occupied entirely by Konsum buildings—flour mills, grain silos, bakeries, macaroni factory, oatmeal flour mills, workmen's houses and flats, sports building and communal store.

Although not allied to the food industry, the illustrations of the township created by the Bata Boot Factory at Zlin, Czechoslovakia, are among the most interesting in the book in this connection of industrial planning on a large scale. A new administrative district of Zlin was created by the Czechoslovak Government in 1931, and this whole area, including a large number of smaller communities, will now be subjected to a comprehensive regional plan which will ensure orderly expansion of the Bata works and a high standard of dwelling and social service for the employer. Used as we unfortunately are to planning on a small scale, the Bata development assumes enormous proportions which are really only comparative.

**The Shredded Wheat Factory, which has a clean and healthy site at Welwyn, Herts, England, in keeping with the product. (Architects: L. de Soissons and A. W. Kenyon. Photo: F. R. Yerbury.)**

# The FOOD GROUP VISITS HOLLAND

## Excellence of Dutch Hospitality and Industry

THE visit of the Food Group of the Society of Chemical Industry to Holland, which began on Wednesday, May 6, and concluded on Thursday, May 14, was by all accounts an outstanding success from the scientific point of view, beside being socially a bright and cheerful voyage of discovery. Dr. A. M. Maiden, in a full description of the tour, published in *Food Industries Weekly* on May 22, remarked that "there is a feeling that no future tour can prove more successful. One thing is certain: in no country will we meet with such invariably good English spoken by our hosts and guides".

### Margarine and Fruit Products

Thirty-five members of the group took part in the tour, which commenced after a really Dutch breakfast of "cold meat, several varieties of bread and rolls, cheese, jam, coffee or tea"! at the Unilever Oil and Margarine Factory in Rotterdam. Here, as in so many Dutch factories, the white tiles of the boiler-house are as clean as those in the rest of the factory, which is apparently an ideal example of a food factory. The visitors were entertained to luncheon and speeches were made by Mr. J. van der Ley, who welcomed the guests, and by Dr. Dunn.

On the same day a visit was paid to the Hero Fruit and Vegetable Preserving Factory at Breda, where fruit juice drinks and canned fruits are produced. It is interesting to note that "Perl" fruit drinks will keep for two years in perfect condition.

### Meat, Biscuits and Macaroni

From the examination of margarine and fruit products the visitors passed on to meat, which was the subject of interest at the Zwanenberg Preserved Meat Factory visited the next day. All the operations are carried through continuously, as in a modern motor-car works. In the afternoon the party was received by Dr. Bendik and Mr. De Gruyter, Jr., and inspected the De Gruyter works at s'Hertogenbosch, which houses the biscuit, macaroni, vermicelli and jam departments, and later the older factory containing the tea, coffee, chocolate, toffee and rice departments.

### Lager Beer

However, no "feast" upon such a variety of foodstuffs would have been complete without a good draught of Dutch Lager Beer, and the organisers may be complimented upon the inclusion of a visit to the South Holland Brewery at The Hague, which was evidently greatly enjoyed, especially the part where beer was served by Mr. Peters (of the Brewery) whilst the visitors sat round upturned barrels!

### Cheese and Milk

After visiting the Nijega Cheese Factory and sampling its products, the members of the group went on to the Bolsward Condensed Milk Factory. At both these Hollandia factories we learn that the milk from each farmer is sampled and tested for dirt on the spot, and a mixed sample for the whole week's delivery is tested for fat, the farmer being paid on the basis of the fat delivered, the skim, buttermilk and whey usually being returned to the farmer after pasteurisation.

At the Amsterdam Municipal Laboratories, which are under the direction of Dr. van Raalte, it was revealed that work on a new process for the preservation of raw milk is now going on, whilst the last visit of all, to the Nederlandsche Gist en Spiritusfabriek, in which bakers' yeast and other kindred products are made, afforded another example of automatic mechanical processing which, it seems, is highly developed in Holland. The yeast-packing machine has been described as "more than human".

We believe that the trip for next year is already under consideration, and owing to the success of the present tour it is likely that more members of the group will take advantage of this excellent idea. Special descriptions of several of the food factories visited will be published in succeeding numbers of FOOD MANUFACTURE and *Food Industries Weekly*.

**The Food Group of the Society of Chemical Industry and the Dutch Chemical Society at Kasteel Oud Wassenar. Dr. L. H. Lampitt, D.Sc., F.I.C., is in the centre of the bottom row with Dr. C. A. Lobry de Bruyn, Chairman of the Board of the Dutch Chemical Society, on his left.**

# FOOD & WAR

**The following letter is from Councillor T. ROSE HILTON, who is a well-known flour miller at Ashton-under-Lyne, and was a member of the Food Committee during the War.**

*To the Editor of "Food Manufacture".*

I was very delighted to read the splendid article which appeared in the April number of FOOD MANUFACTURE, by T. H. Fairbrother, M.Sc., F.I.C., "Are we Prepared?"

I think it is one of the finest articles dealing with this subject that I have ever read, and ought to be brought to the notice of every Member of Parliament. Those of us who were engaged in the Food Trade during the years 1914 to 1918 will agree with every word Mr Fairbrother writes. In my capacity as President of the Ashton-under-Lyne Grocers' Association during the war years of 1914-1919, and having represented that body on the General Purposes Committee of the Grocers' Federation, and served on the Food Council, I have first-hand knowledge of the deplorable state of our National Food Reserves when war broke out.

In pre-war days we purchased 75 per cent. of our sugar from Germany and Austria, our butter from Denmark and Finland, our bacon and lard from America and Denmark. When the war commenced these countries had their own supplies and ours too, and had it not been for our wonderful Colonies we should have been starved into surrender. In fact, at one time, when the U-boat menace was at its height —1917—this country was within three weeks of starvation.

Every housewife will well remember how she had to queue up for her ½ lb. of sugar, 1 oz. of butter and 4 oz. of margarine. We never really realised what Napoleon meant when he called us "A Nation of Shopkeepers" until those terrible years of food shortage. Then we found out that this country of ours produced practically nothing, but depended upon other countries doing for us what we ought to have done for ourselves. But apart from not producing our foodstuffs for ourselves, no one seemed to have had the sense to provide any adequate storage of foods obtained from abroad. We can be excused for that in 1914, as we did not expect war then, but those war years should have taught us our lesson, and we have no excuse now for ignoring this vital precaution.

Our Government are engaged at present in strengthening our defences and, in my opinion, rightly so, but surely if it is right to protect our women and children from some outside foe, it is just as important to see that they are provided with food, and yet our Government do not appear to have given it the least consideration.

I thought the way Mr. Fairbrother opened his article by quoting the old story of Joseph (the first Food Controller) from the Book of Genesis, was a capital illustration of what he had in mind, and in the article he has given some indication of how a number of vital foodstuffs could be stored satisfactorily to-day. Modern science has altered our conception of methods of storage, and conditions to-day are very different from those of the time of Joseph. With Mr. Fairbrother's extensive technical knowledge and experience of the problems of the storage of grain and other foodstuffs he speaks with authority, and his views cannot be regarded lightly, and I do suggest in all seriousness that you, Mr. Editor, will do all in your power to bring that article to the notice of the powers that be, and in this way you will not only bring credit to your worthy journal, but you will also perform a service to your fellow-countrymen which will be a blessing for all time.

T. ROSE HILTON.

*April 29, 1936.*

## TANNIN & CAFFEINE in TEA & COFFEE

AT a joint meeting of the Society of Public Analysts and the Food Group of the Society of Chemical Industry held recently, the papers read included several on the subject of tannin and caffeine in tea and coffee. Abstracts of these papers are given below.

*The Constitution of Tannins, including those of Tea and Coffee.* By Peter Maitland, B.Sc., Ph.D.

An outline was given of the most recent views on the constitution of the various classes of tannins included in the groups of Freudenberg's classification into (i) hydrolysable tannins, (ii) condensed tannins, and (iii) unclassified tannins. The position of tea tannin in relation to this classification was discussed.

*Experimental Work on Tea Tannin.* By M. Nierenstein, D.Sc., Ph.D.

The author described the preparation of a crystalline derivative which he had obtained from Assam tea by the action of a tannase, and discussed its constitution in relation to the problem of the nature of the tea tannins.

*The Pharmacology of Caffeine, and of Tea and Coffee.* By G. Roche Lynch, O.B.E., M.B., B.S., F.I.C.

An outline was given of the physiological effects of caffeine upon the central nervous system and the muscular tissue, and upon the action of the kidneys. Fatal cases of caffeine poisoning were rare, but there have been cases of serious illness. No post-mortem appearances that could be correlated with excessive drinking of tea or coffee had been reported.

*Coffee Essences.* By E. Hinks, B.Sc., F.I.C.

The amount of caffeine affords some indication of the proportion of coffee in commercial coffee extracts. Twelve coffee extracts contained from 0·1 to 0·33 per cent., 45 extracts from mixtures of coffee and chicory contained 0·5 to 0·38 per cent., and a sample of dry extract contained 6·8 per cent. of caffeine.

*A Note on "Tanninless" Teas.* By H. H. Bagnal, B.Sc., F.I.C.

Examination of a large number of samples of so-called "digestive" teas, claiming to contain very little tannin or none at all, has shown that there is no scientific basis for the claim. In 22 samples, out of 29, the amounts of tannin ranged from 11 to 14 per cent., and each of two China teas contained 8·3 per cent.

Other papers were entitled: *A Survey of the Methods of Analysis for Tannins.* By C. Ainsworth Mitchell, M.A., D.Sc., F.I.C.; *The Tannins in Tea.* By P. J. Norman, B.Sc., A.I.C., and E. B. Hughes, D.Sc., F.I.C.

## Butter and Margarine in Central Europe

THE available supplies of butter and edible fats have been a matter of anxiety in Germany although the internal press has made scarcely any reference to it. The price of butter has risen to something like five times what it is in Great Britain, so that it is beyond the reach of the majority of the population. An interesting sidelight on the subject is that some of the Olympic teams visiting Germany took considerable supplies with them for their own use, although importation of butter and edible fats is normally very strictly controlled and limited to avoid excessive foreign purchases. The price of other fats has naturally risen in sympathy.

It would appear that butter is at present dearer on the Continent than here, and margarine concerns are increasing their output to meet larger demands for butter substitutes. This has led to a heavier demand for edible oils from British colonies and for lard and animal fats as well as vegetable oils generally. Czechoslovakia increased her imports for these products in 1935 to 900 waggon loads, 400 from Hungary and 200 from Jugoslavia, in addition to a larger importation of live animals from these states. Some 300 waggons went to the principal margarine works.

J. G. F. D.

# FLAVOUR in BREAD

THE investigation of bread flavour has presented considerable difficulty. Dr. A. M. Maiden (*J.S.C.I.*, 1936, **55**, 143-145) divided bread flavour into three factors: (1) The strength of the smell; (2) the desirability of the smell; (3) the desirability of the taste. After a number of trials a method was developed for investigating the effect of adding various substances. Flavour can only be judged by a living person, and the particular persons employed as flavour judges had to be tested as to their suitability for the job. A panel of six persons was selected and various experiments were carried out. Experience showed that it was impossible to get a reliable opinion on bread flavour if more than three loaves were submitted together to an observer. In addition, the uncertainty of a baking test, the uncertain judgment of even a picked band of flavour judges, made the rate of progress very slow.

The effect on bread flavour of acetyl methyl carbinol and di-acetyl were also investigated. Both substances were tested in plain and enriched doughs, the enriched doughs containing 4 lb. fat, 4 lb. skim milk powder, and 1 lb. malt flour per 280 lb. flour, while both types of doughs were fermented for three hours at 80° F. In the plain doughs acetyl methyl carbinol at 0·015 per cent. and di-acetyl at 0·00188 per cent. of the flour had no effect on bread flavour. When the amounts used were doubled, the flavour of the bread was definitely spoiled. At 0·0075 per cent. the di-acetyl spoiled the flavour hopelessly. In the enriched doughs there was evidence that none of these additions were retained in the bread. The amount of acetyl methyl carbinol that just did not affect the smell of the enriched bread was 0·0075 per cent., half the rate found for the plain doughs, and that for di-acetyl, 0·00047 per cent., was a quarter of the plain dough threshold rate. As these amounts were increased, the strength of the smell increased.

In the plain doughs both acetyl methyl carbinol and di-acetyl, when used at rates above the threshold rate, decreased the desirability of the taste. In the enriched doughs, however, even when the smell of the bread was quite definitely decreased in desirability, the taste remained unaffected. Not until di-acetyl was used at 0·0075 per cent. of the flour, at which rate there was a very definitely foreign smell in the bread, was there any decrease in the desirability of the taste. In no case was it found that an increase in the desirability of the bread resulted through the addition of either of those substances.

# BRITISH CHEMICAL PLANT EXHIBITION, 1936

THE following is a list of exhibitors, together with Stand Nos., at the British Chemical Plant Exhibition, 1936, to be held at the Central Hall, Westminster, London, S.W.1, from June 22 to 27. The Exhibition coincides with the holding of the Chemical Engineering Congress.

The Aluminium Plant and Vessel Co., Ltd., A 7 and 9.
Ashmore, Benson, Pease and Co., Ltd., B 5.
Audley Engineering Co., Ltd., B 2.
Henry Balfour and Co., Ltd., B 23 and 28.
Bennett Sons and Shears, Ltd., A 12.
British Gas Federation, B 4 and 6.
The British Oxygen Co., Ltd., B 20.
Thomas Broadbent and Sons, Ltd., A 15.
Brown Bayleys Steel Works, Ltd., B 30.
Cannon Iron Foundries, Ltd., A 10.
T. and C. Clark and Co., Ltd., A 3.
Dorr-Oliver Co., Ltd., B 21 and 24.
Doulton and Co., Ltd., B 12.
Enamelled Metal Products Corporation (1933), Ltd., B 23 and 28.
Firth Vickers Stainless Steels, Ltd., A 6.
Grant and West, Ltd., A 5.
Hadfields, Ltd., B 3.
Hathernware, Ltd., A 11.
The Hydronyl Syndicate, Ltd., A 13.
International Combustion, Ltd., B 22.
The International Electrolytic Plant Co., B 19.
S. H. Johnson and Co., Ltd., B 8.
George Kent, Ltd., A 17.
Kestner Evaporator and Engineering Co., Ltd., A 1.
H. K. Lewis and Co., Ltd., B 14.
Thos. Locker and Co., Ltd., B 13.
Manesty Machines, Ltd., A 14.
Manlove, Alliott and Co., Ltd., B 18.
R. Marsh and Co., B 16.
The Mond Nickel Co., Ltd., B 17.
Negretti and Zambra, B 15.
The Pascall Engineering Co., Ltd., B 31.
Premier Colloid Mills, Ltd., A 19.
Saunders Valve Co., Ltd., B 9.
George Scott and Son (London), Ltd., B 23 and 28.
Siebe, Gorman and Co., Ltd., B 25.
George Skey and Co., Ltd., B 11.
Society of Chemical Industry, B 26.
Stevens and Manning, A 16.
The Tintometer, Ltd., A 2.
Tungstone Patent High Pressure Die Casting Co., B 27.
United Steel Companies, Ltd., B 7.
United Water Softeners, Ltd., B 32.
Watson, Laidlaw and Co., Ltd., B 1.

**"FOOD MANUFACTURE" STAND No. A 4.**

**Visitors to the British Chemical Plant Exhibition are cordially invited to take advantage of the facilities available and to join in afternoon refreshments on the Stand of "Food Manufacture".**

# THE COMMON HERRING

(Clupea Harengus, Linn.)

The Third and Concluding Part of the article by ELLIOT B. DEWBERRY, M.R.I.P.H., M.R.San.I., dealing with the food value, life history and commercial preservation of the common herring

## The Herring Fisheries

*Scotland*.—Fishing takes place along the whole of the east coast of Scotland, including the Shetlands and Orkneys, from Wick to Eyemouth. The winter and early spring fishery is mainly in the Firth of Forth near May Island and at Wick and Stornoway. From May to June fishing is carried on off the Shetlands (east side), and from July to December off the Orkneys, Shetlands, Aberdeen, Peterhead, Fraserburgh, and Wick.

*England*.—The east coast spring fishery commences in May at North Shields and Lowestoft, and in June, July, and August is carried on at Berwick, Seahouses, Blyth, North Shields, Hartlepool, Scarborough, Grimsby, and Whitby. In September the great fisheries commence at Yarmouth and Lowestoft, reaching their maximum in October and decreasing in November. These herrings are caught during their migration to the Straits of Dover and the north coast of France. In October and November fishing takes place at Folkestone and Hastings, and from November to January at Torbay, Plymouth, Newlyn, and St. Ives.

The Norway herring fishery season opens about the end of December and finishes about the middle of May.

## Fishing

The commercial methods of catching herring are by trawling, drifting, and seining (sets nets).

*Trawling*.—This is now almost entirely confined to German fisheries and is prohibited within the territorial waters of England, Scotland, and Wales. The first trawled herring were landed at Wick in 1902. The chief objection to this method of fishing was that the meshes of the trawl-net were comparatively small and closed by the action of the net when in use. It not only caught immature herring, but also destroyed the eggs and young larvæ. In 1911 a Government Committee of enquiry was appointed, owing to the great agitation against trawling, which was considered a menace to the herring industry.

*Drifting*.—Drift-netting, or driving, which is in general use off the coasts of England and Scotland, has been carried on from time immemorial on the same fishing grounds and at the same time of year without detriment

The illustration above, which is reproduced by permission of the Department of Overseas Trade, was taken on a German Herring trawler. The three other illustrations to this article are by courtesy of MacFisheries Ltd.

to the future supply of herring. The majority of the drifters are steam driven (introduced in 1897), but there are still a few motor-propelled vessels in use. The term "drift-net" is derived from the manner in which the nets are worked. They are neither fixed or towed within any precise limits of water, but are cast or shot at any distance from the land and are allowed to drift in whatever direction the tide may take them.

The drift-net is a single stretch of specially prepared cotton netting from 100 to 180 feet in length and about 30 to 40 feet in depth. In Scotland a mounted net ready for fishing measures about 100 feet in length and 46 to 50 feet in depth. These are fastened together end to end, forming a train, fleet, or drift of nets. The number comprising the fleet of a drifter varies from 50 to 130 or more. The net is so constructed (mesh 1 inch square) that the herring is able to push its head through, but not its body. Once the gill covers are caught it is impossible for the fish to release its head. The upper edge of the net is supported by cork floats, and as an additional support buoys (bowls, buffs, or pellets)—*i.e.*, balloon-shaped canvas bags, painted various colours, are attached by a rope to the corner of each net. By lengthening or shortening this rope the net can be kept at any distance below the surface of the water. The net nearest the drifter ("look on net") is marked by a white buoy (puppy). A drifter usually shoots its nets in the late afternoon, and a complete wall or barrier of netting, perhaps two or three miles in length, is hanging perpendicularly in the sea, either at the surface or a few fathoms down. After "shooting" a vessel lies head on to the nets until the morning, or such time as a considerable quantity of fish are found enmeshed. The nets are hauled in by a steam capstan and the catch shaken out. The vessel then proceeds home at full speed so that samples of fish may reach the market as early as possible. The herring are removed from the drifter in baskets (swills) each holding a cran which consists of 450 to 500 fish, approximately 1¼ cwt. A good shot, or catch, averages 90 to 100 crans.

The wind has a distinct influence on successful fishing. A northerly breeze is preferred at the start of the season. It is said that a S.S.E. wind with unsettled weather accompanies a good catch. In calm weather herring swimming near the surface can be distinctly heard, and at night their phosphorescent bodies cause streaks or sheets of light on the surface of the sea.

The heaviest catches of herring have always been associated with a full moon, particularly in connection with the East Anglian fisheries. From time to time many theories have been put forward to account for this curious phenomena, but no satisfactory explanation has been given. The study of "Lunar periodicity" on fish has been investigated by Savage and Hodgson, of the Fisheries Laboratory, Lowestoft, and the following is an extract from their paper on this subject:

"We have found a definite rhythm in the quantities of herrings caught off East Anglia, a monthly rhythm with maximum coinciding with the period of 'full' moon. Regarding the abundance in the great autumn fishing, we learn that the early October full moon is not likely to cause a definite peak in the landings. The best condition for a productive fishery appears to be when the October full moon occurs during the second week, for in this case it is found that the peak in landing which accompanies this moon is approximately equal to the peak which appears at the time of the November full moon. Under these circumstances a period of five weeks of good fishing can be expected."

## Commercial Processes for the Curing of Herring

Fish curing by salting, drying, pickling, or smoking has been practised since the earliest times. The various methods and recipes have been passed on traditionally from family to family and carried out by rule of thumb and experience. It is only in comparatively recent years that a scientific study of the processes has been made.

The principle involved in salting is one of "Osmosis", in which a certain amount of salt combines with the water actually present in the fish flesh. Subsequently curing may be completed by allowing the fish to remain in the pickle of its own creation, or by being dried in the sun or by artificial heat, or smoked.

Abroad the curing of herring takes place aboard the vessel, but in Great Britain this is accomplished ashore.

*Salted Herring.*—Herring are salted chiefly for export, and before the Great War the average amount exported was about 400,000 tons, but to-day the number has fallen to about 290,000 tons; trade is, however gradually improving.

The fresh herring are taken to the curing yards, placed in troughs about 4 feet wide, sprinkled with salt, gutted, and sorted according to size into three tubs. The whole process is usually carried out by Scotch women, whose dexterity in wielding a sharp knife to split and gut the fish almost at one single stroke is amazing to watch. One woman will eviscerate two dozen herring in a minute. In most herring the gut is small and easily removed, but fish from North Shields have a large distended gut and are difficult to clean. Yarmouth herring are, however, firm and well adapted for cleaning and curing.

The tubs of gutted fish are emptied into shallow receptacles called "rousing tubs" and well mixed with salt. They are afterwards carefully packed in barrels, bellies downwards, between layers of coarse hard salt, every successive row crossing at right angles to that which precedes it. The barrels are then covered, turned on their sides, and rolled over every second or third day for about eight days. The salt slowly dissolves and penetrates every part of the herring. At the end of this period the barrels are opened, a hole drilled in the sides at the bilge, and the pickle (saturated brine), which contains amino bases and coagulable proteids, drained off for future use. More fish and salt are added to completely fill the barrels, which are then fastened down, turned on their sides, and filled with the pickle and the holes sealed up.

Approximately 1 cwt. of salt is required for each cran of about 1,000 fish, 5 to 6 tons of salt being sufficient for 100 crans of herring. The fishery salt must be coarse grained, hard and free from impurities such as sulphates and chlorides of calcium and magnesium. "Crown" branded herring contain about 15 per cent. salt, and the trade mark cure about 10 to 12 per cent. of salt respec-

tively. It is necessary to store the latter cures at freezing temperature.

The food value of the herring is considerably increased by salting, as shown by the following analysis by Dr. W. S. Gibbs, late chief chemist to the Salt Union:

| | *Water Per Unit.* | *Salt Per Cent.* | *Fat Per Cent.* |
|---|---|---|---|
| Fresh herring, ungutted ... ... | 67·33 | 0·63 | 13·78 |
| Lightly salted before gutting ... | 66·33 | 1·27 | 12·11 |
| Gutted and salted ready to pack into barrels ... ... ... | 61.09 | 1·41 | 16·14 |
| After seven days salted in barrels | 52·67 | 7·43 | 17·10 |
| After eight days salted in barrels | 46·90 | 11·49 | 22·50 |

Experiments were carried out at the Torry Research Station, Aberdeen, to ascertain whether, if a smaller quantity of salt was used in curing herring, it would be possible, without unduly reducing the temperature of the cold store, to still assure a satisfactory cure. Results showed that a cure containing only 5 per cent. salt, stored at −6° C., kept sound and palatable for six months. Storage, however, must be prolonged almost to the moment of consumption. This can be done in the ordinary mechanical refrigerator.

*Bloaters.*—These are unsplit herring, slightly cured and smoke-dried. They are usually full-roed fish of the best quality and intended for immediate sale and consumption. As soon as possible after the herring are landed they are rubbed with coarse salt, washed in running water, placed in brine and lightly salted for about two hours. They are then threaded on sticks and smoke-dried for about eight hours; cooled and packed fifty in a box. Scotch bloaters, properly cured, are of a silvery yellow colour and taste slightly of the wood smoke.

Bloaters for foreign export are salted in tanks for about five days and afterwards smoke-dried for two days.

*Kippers.*—The herring are split from head to tail along the back and the gills and viscera removed. They are then washed, allowed to drain, and afterwards pickled in strong brine for half an hour. The fish are opened out, hung on hooks attached to wooden bars (kipper speets), and placed in a kiln one above another. When the kiln is full, smoking is commenced, the smoke being made by smouldering oak turnings and sawdust. The process usually takes from eight to ten hours, and a certain temperature must be maintained or the kippers will not acquire a good colour. On completion of the process the fish are removed and placed on racks to thoroughly cool and are afterwards placed in boxes according to size. As a general rule a box contains twenty pairs of large size, thirty pairs of medium, or forty to fifty pairs of small kippers.

*Red Herring.*—These are usually prepared for export to sub-tropical countries and need careful curing to ensure good keeping qualities. They are not gutted, but dry-salted in concrete storage tanks 10 by 6 feet deep, to hold approximately twenty-five crans of fish, for a period varying from five days to several months, according to requirements. After removal the herring are threaded on speets (which are rods 3 feet 6 inches long, holding about twenty-five to thirty fish) through the mouth and gill openings, and hung in clean water from one to two days and afterwards dried in the open air. The speets are then placed horizontally in the kiln and smoked from ten days to six weeks, according to the colour required. The rate of curing depends on temperature, prevailing weather conditions, and fuel used, which is usually of a hard variety, such as oak turnings, sawdust, or shavings. The fires are lighted each night and allowed to burn themselves out. The smoke not only dries the herring, but gives them the peculiar resinous (guaiacol and creosol) flavour and mild antiseptic properties. Red herring are usually packed in boxes containing sixty to seventy fish.

## The Preservation of Herring by Refrigeration and Cold Storage

The supplies of herring are to a large extent seasonal and the catches also fluctuate. At times there is a glut, with the result that some of the fish have either to be returned to the sea, or sold for use as manure. At other times the catches are poor and the market suffers in consequence. In the winter and early spring, when the East Coast fisheries are closed, herring are imported from Norway.

It would appear that in order to cope with the situation some satisfactory method of refrigeration and cold storage is required, whereby it would be possible to preserve the surplus herring and enable supplies to be spread evenly throughout the year. Such a scheme would not only benefit the herring industry, but would also allow of a proper distribution of a cheap, wholesome, and nourish-

Herring Crans holding 800-1,000 fish.

**This illustration shows girls at work gutting herring, a process which is usually carried out by Scotch women. It is amazing to watch their dexterity in wielding a sharp knife, the splitting and gutting of the fish being done at a single stroke.**

ing food to be made in the winter and early spring to towns and villages away from the coast.

Experiments in refrigeration—as a method of preservation—have been carried out at the Torry Research Station, where a special study is made of the cold storage of fish. It has been found that to prevent changes taking place in the membranes and tissues of herring, freezing must be carried out very rapidly, as the longer the time taken to bring the fish down to the required temperature, the greater the damage done. This can be accomplished by immersion in circulating brine at −21° C. The temperature to be maintained in the cold store is also most important. It has been found that herring stored at −21° C. are successfully preserved for four months and are almost identical with fresh fish. After thawing they also make first-class kippers and bloaters, which compare favourably with those cured from fresh herring.

Experiments have also been made to ascertain the length of time that ice will keep "fresh" herring. A batch of herring were kept in ice for fourteen days and examined at intervals, when the odour, appearance, firmness, state of viscera, etc., and suitability for kippering were noted. The conclusion is that ungutted herring are quite fresh after four days in ice, and may be turned into kippers in six days. This result shows the advisability of carrying ice on board drifters as a "short-term" preservation, especially for "over-day" fish, as deterioration sets in rapidly after they are taken from the nets.

**Salting and Packing Herrings for Export.**

# CORRESPONDENCE on EGG ALBUMEN

## *From the Secretary of Prestat Ltd.*

I note in your January issue that a correspondent, No. 1,970, mentions the objectionable smell in products incorporating egg albumen, and your reply to the effect that there should be no smell. Assuming that your correspondent had been using prime hen egg albumen desiccated I think a slightly objectionable smell is inevitable. I have examined many samples of the very highest grade, guaranteed odourless, but I have not come across any entirely free from smell. In the case of cold glacé covering the smell will entirely disappear after a short time if the goods are well ventilated. I agree it might be more difficult to free marzipan of this odour, as the natural oil might tend to retain it indefinitely, but, as you wisely remark, why use it in good marzipan at all?

The high cost and the above-mentioned disadvantage might appear to be good reasons for replacing hen egg albumen by the synthetic article, but personally I am not in favour of it. Far too many synthetic products and short-cut processes are being used which do not and cannot adequately replace the three time-honoured factors—skill, time, and genuine raw materials.

A. P. D. Dufour (*Secretary*).

# INFORMATION and ADVICE

## Worcestershire Sauce—Blackening of Tin—Yeast Manufacture—Stale Bread—Sealing of Tins—Orange Squash

### Worcestershire Sauce

2,012. *We have been manufacturing Worcestershire Sauce for some years, but are desirous to obtain, if possible, a better product.*

*May we ask you to let us have one or two recipes so as to enable us to compare these with our own, and see if we can include in our preparation certain ingredients that we are not employing at present?* (Belgium.)

A recipe for such a sauce that we are able to give is as follows:

| | |
|---|---|
| West Indian tamarinds .. .. | 50 lb. |
| Shallots .. .. .. .. | 12 ,, |
| Garlic .. .. .. .. | 12 ,, |
| Foot sugar .. .. .. .. | 50 ,, |
| Salt .. .. .. .. .. | 20 ,, |
| Cayenne .. .. .. .. | 1½ ,, |
| Ginger .. .. .. .. | 4 ,, |
| Pimento .. .. .. .. | 1 ,, |
| Cinnamon .. .. .. .. | 1 ,, |
| Mace .. .. .. .. | ½ ,, |
| Cloves .. .. .. .. | ½ ,, |
| Lime juice .. .. .. .. | 12½ gal. |
| Indian soy .. .. .. .. | 5 ,, |
| Vinegar (16 grain) .. .. .. | 74 ,, |

Boil the tamarinds with 10 gal. of the vinegar and pass through a pulping machine to remove stalks and stones. Dissolve the sugar in 10 gal. of the vinegar by boiling and pass through a fine sieve.

Place all ingredients in a pan or vat and simmer for an hour. Pass through a flat stone mill, followed by a fine sieve.

We would point out that the quality of the sauce which you ultimately obtain is very much dependent upon the method of manufacture, which must be carried through with care at every stage, with which you will be familiar.

### Blackening of Tin

2,013. *We have recently purchased a second-hand Copper Comfit Pan which has been tinned with pure tin. The pan has been thoroughly scoured several times with soda and soap. This did not seem to clear it effectively, and the tinned surface was treated with a slurry of silver sand.*

*Our process consists of gelatine-salting of nuts. The nuts are put in the pan cold and gelatine solution added. The pan is set in motion, and, when the gelatine has thoroughly mixed, the requisite quantity of salt is dusted on.*

*We find when using this pan that the nuts get very dirty, and, as the pan is thoroughly washed out before using, it appears that this "dirt" is coming from the tinned surface. A piece of tissue paper becomes blackened when rubbed on the tinned surface of the pan, and we are wondering if this is usual with pure tin.*

*We are of the opinion that salt has no action on pure tin, and should like this confirmed. Can you suggest any cause of this trouble?*

*The firm who tinned the pan assure us that pure tin has been used.*

*We enclose samples of nuts which have been* (a) *salted in the pan and* (b) *salted by hand on a bench.* (London.)

We have been informed that pure tin is liable to give a black mark if subjected to severe abrasion, in the same way as pure lead is able to mark paper (although to a much smaller extent). The trouble experienced in your case is most probably due to the abrasion of the nuts and salt on the tin surface, and not to any corrosive action of the salt. It is practically certainly not due to the way in which the tinning operation is carried out.

If it is possible to arrange that the amount of abrasion to which the tin surface is subjected is not excessive, the trouble would probably be overcome.

### Yeast Manufacture

2,014. *I am interested in the manufacture of yeast and want to manufacture a product which will keep for some time; can you assist me, please?* (Germany.)

Dried yeast can be manufactured by placing the compressed yeast as it comes from the filter presses on to aluminium trays in thin layers and then placing these in a drying chamber, the temperature of which should not exceed 100° F. The moisture should be withdrawn by means of suitable fans.

In America yeast cakes were formerly made (and may even be made to-day) by mixing the yeast with ground cereals and making the dough into biscuits about ¼ in. thick, which are dried at as low a temperature as possible—below 100° F.

### Stale Bread

2,015. *We have a very large surplus of stale bread on our hands and wonder if you can assist us as to the marketing of this, or furnish us with details regarding the manufacture of any product made from stale bread.* (Auckland.)

Stale bread can be used in several ways.

1. *Sausage Rusks.*—An article dealing with the manufacture of these appeared in the August, 1935, issue.

2. *Bread-crumbs.*—These are popular for fish-frying in the home and for other purposes, such as coating fish cakes, rissoles, cutlets, etc. The fine crumbs which are

separated during the production of sausage rusks should be roasted to a light brown colour and put into small packets.

3. *Brown Bread.*—A type of brown loaf which will keep fresh can be produced by toasting the bread to a degree of caramelisation to be determined and grinding the product to a fine powder. This powder can be mixed with white flour in the proportion of three parts white flour to one part of crumb and fermented on a short process. The bread will be found to keep fresh for a much longer period than is usual and will possess a unique flavour.

4. These crumbs can be used for the production of digestive biscuits, since the toasted crumbs will have been fermented and further modified by roasting, thereby rendering them more digestible than ordinary flour in biscuits.

### Sealing of Tins

2,016. *A client of ours wishes to put on the market a new brand of biscuits, and as it is essential that they should reach the public as fresh as possible, we should be obliged if you could advise us as to the best method of sealing. They are to be sold in tins, and the sealing could be applied to the tin or the wrapping inside, or both. What would you recommend in the way of inside paper and methods of sealing?* (London.)

The choice of a suitable method of sealing biscuit packages depends entirely upon how long the biscuits are required to be kept in a factory-crisp condition. For popular markets the best method is to seal the tin lid on by means of a strip of adhesive tape, which renders the tin sufficiently airtight for ordinary requirements—although it cannot be called absolutely airtight since it will not remain so for an indefinite period—air is bound to penetrate the seal after a long time.

If the adhesive tape is too expensive for the proposed product's market the tin can be sealed with a paper strip, the airtight properties of which are necessarily limited in ratio to the nature and substance of the material. In either case, to ensure that the product is absolutely airproof it is advisable to employ an airtight inner wrapper. For this purpose waxed paper is used which has the property of being absolutely airproof, and, when sealed (by the application of heat), ensures that the contents will be maintained in factory-crisp condition, irrespective of the method of sealing the tin itself, as in the event of the tin not being absolutely airtight it is impossible for air to penetrate the sealed wax wrapper. An inner wrapper of this material and/or an adhesive sealing tape around the tin lid—forming a perfect joint between lid and tin—is the method of packing generally employed for the home market since, due to the fact that all biscuits have a very quick sale, the possibility of air penetrating the outer seal within the relatively short period which elapses from the time they leave the factory until they are opened by the consumer is very remote.

For export markets, to ensure that the pack is absolutely airtight for an indefinite period, and particularly in view of changes in climatic conditions, it is essential that the tin lid be sealed on by means of solder. As a further protection it is sometimes advisable to include an inner lid—which also is soldered on, rendering the tin doubly soldered—inner and outer lids. The employment of this method of double sealing is governed by the nature of the product, its destination, varying climatic conditions in transit, and like circumstances.

### Orange Squash

2,017. *Would you please let us have a reliable formula for the preparation of orange squash containing $SO_2$ as a preservative, also particulars regarding the quantity of sugar and water for the preparation of syrup for 20 gallons orange juice, density of the syrup Baumé, and temperature at which it should be mixed with the juice? What ingredients, preservatives and flavours should be added, and when? At what temperature should the squash be bottled? Can you say how long imported orange juice in barrels will keep and if any additional preservative is required?* (England.)

The following, we have been informed, is a tested recipe for orange squash:

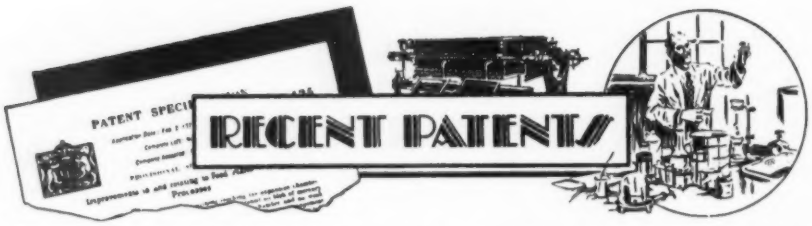
| | |
|---|---|
| Orange juice (with cells) .. | 20 gal. |
| Sugar syrup, 31 Bé. .. .. | 20 gal. |
| Citric acid (powdered) .. | 2 lb. 4 oz. |
| 5 per cent. solution Aurantine colour .. .. .. | 2 fl. oz. |
| Orange essence .. .. | 4 fl. oz. |
| 6 per cent. sulphurous acid .. | as required. |

The amount of 6 per cent. sulphur dioxide will depend on the amount already in the orange juice, but assuming the amount is 300 parts per million, then the amount required would be 21 fl. oz. The legal limit of sulphur dioxide in the finished squash is 350 parts per million, and this should always be checked by an analyst when using a new recipe.

It is often customary to use a proportion of lemon juice for orange squash, not only to improve the flavour but also to get more fruit cells in the drink. In the above recipe, for example, 15 gal. of orange juice might be used, and 5 gal. of lemon juice.

In order to make the syrup for the above recipe, weigh out 145 lb. of granulated sugar and dissolve in 10·9 gal. of water. This is best done in the *cold*, and filtered immediately before use, but if heat is applied to dissolve the sugar the syrup must be cooled to room temperature before adding to the juice. This is a difficult operation, and this is why the cold process is recommended. All the ingredients should be mixed cold, and the squash bottled cold. If the mixing and filling pans are clean, and the correct amount of preservative has been added, there need be no fear of any fermentation or other troubles. It will keep indefinitely.

Imported orange juice should keep in good condition for at least twelve months, but casks should be stored in a cool place. The amount of sulphur dioxide in each cask should be ascertained on delivery, and if low the amount should be made up to about 600 parts per million by the addition of the requisite amount of 6 per cent. sulphur dioxide.




*These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).*

### Latest Patent Applications

9035. MUSHER, S.: Inhibitors for packaged products. March 26. (United States, March 29, 1935.)

9442. KROULIK, A.: Process for removing bitter substances from yeast. March 30.

9657 and 9658. CALIFORNIA FRUIT GROWERS' EXCHANGE: Treating vegetable matter containing pectin. April 1. (United States, April 1, 1935.)

9842. DANISH BACON CO., LTD., and KIDNEY, A. J.: Means for preventing discoloration of containers for food. April 3.

10318. HELLERUD, R.: Manufacture of vinegar. April 8.

10355. GENOVA, A. F.: Preparation of ice-creams, etc. April 8.

10484. KLOZ, G.: Means for determining degree of acidity in liquids. April 9.

10735. MAYRHOFER, G.: Methods of determining fat contents of milk, etc. April 14. (Austria, April 17, 1935.)

11519. REWALD, B. A.: Production of oils from fish liver, etc.

11791. RIVENBURGH, F. L.: Apparatus for testing eggs. April 25.

11931. FAIRWEATHER, H. G. C. (TROPICAL FRUIT PRESERVES PROPRIETARY, LTD.): Preservative for fruit, etc. April 27.

### Complete Specifications Accepted

444,619. CHRISTENSEN, H. P.: Treatment of fatty animal raw material, particularly whale blubber, on pressure-steam digesters.

444,813. MATHIESON ALKALI WORKS: Bleaching of fatty acids, oils, and fats.

444,924. DELONG GUM CO.: Machines for use in the manufacture of chewing gum or other confections.

444,929. BALLA, M.: Production of aeration yeast.

445,002. DIEFENBACH, DR. A.: Process for opening up cocoa beans.

445,043. THOMASSON AND CO., LTD., T., and TAYLOR, G.: Cans or containers for enclosing bottled products.

445,073. HANSEN, D. A.: Utilisation of whale meat. (Divided out of 28652/34.)

445,229. BARUTH, M., BARUTH, K. H., and BARUTH, L. L.: Process for preparing tea free from theine.

445,275. SCHMALFUSS, H., and WERNER, H.: Treatment of the tissue of marine animals. (August 31, 1934.)

445,293. MAANEN, D. H. J. VAN: Extraction of juices from exhausted sugar-beet cossettes, fresh cossettes, and other air-conditioning substances. (November 7, 1933.)

445,481. MUTUAL CITRUS PRODUCTS CO., INC.: Pectous material and process of making the same.

445,511. KING, H. J. H., and HOPPER, W. S.: Manufacture of malt.

445,545. HANSEN, D. A.: Utilisation of whale meat. (October 11, 1933.)

445,650. DEUTSCHE SOJAWERKE GES.: Process for producing a special malt.

445,655. FEATHERSTON, J.: Cans, drums, and like containers for food or other substances.

445,714. VEREINIGTE MAUTNER MARKHOF'SCHE PRESSHEFE FABRIKEN, and SZILVINYI, A.: Production of yeast. (Cognate application 30039/34.)

446,190. CROSSE AND BLACKWELL, LTD., CLAYTON, W., and JOHNSON, R. I.: Sealing containers. (Addition to 432,571.)

446,203. BENZ, J., and HILGERS, W. (trading as Benz and Hilgers): Machines for grading eggs or other goods according to weight.

446,226. LIBBY, MCNEIL, AND LIBBY: Process of producing a food product. (Cognate Application 17070/35.) (June 25, 1934.)

*Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.*

### Abstracts of Recent Specifications

***Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 25s. each.***

440,169. **Cheese.** REIGNIER, F., 36, Rue Sommeiller, Annecy, France.
Cheese for use in making grated cheese is obtained by mixing cheese which has been melted or remelted with fresh unmelted cheese which may be finely divided. The melting may be effected with the aid of steam or vacuum or of acid or alkaline salts. Salt, spices, or other flavouring materials may be added during the melting and mixing. The product may be run into moulds, and slight pressure may be applied to its surface to facilitate moulding. After withdrawal from the moulds the cheeses are left to dry until suitable for grating.

441,232. **Treating rice.** STOKKEBYE, E. O., 12, Arkivgatan, Gothenburg, Sweden.
Rice is treated by moisture and heat—*e.g.*, by the addition of water to the rice in a closed vessel, the mixture being subsequently heated—or by blowing steam into the vessel containing the rice, such vessel being heated from the outside by electricity, hot air, or by a steam jacket, the temperature being raised to about 212° F. and the rice being subjected to the treatment for at least thirty minutes so that the moisture contact of the heated product does not exceed 20 per cent. The treated grains are then without cooling or drying rolled into flakes. Sugar, salt, fat, or spices may be added with the water.

441,574. **Soya bean milk preparation.** J. H. KELLOGG, 202, Manchester Street, Battle Creek, Michigan, U.S.A.
A process is described for preparing acidophilus milk wholly or partly from the milk of soya bean. It has previously been proposed to make artificial milk from soya beans and the like by adding pure cultures of lactic bacteria (including B. lactis acidi). The present process, however, claims the addition of strains of Bacillus acidophilus which are found to grow vigorously in this medium and impart an agreeable flavour. A further advantage of B. acidophilus milk is the favourable influence it exercises upon the character of the intestinal flora. Although ordinary cultures of B. acidophilus do not grow readily in cow's milk, the addition of a soya bean product inoculated with this bacillus to cow's milk results in development of a satisfactory acidophilus milk product with much greater rapidity. Thus, soya bean milk (as made by the process described in U.S. Pat. 1,444,812) is inoculated with a pure culture of B. acidophilus and maintained at a temperature of 100° F. for about 10 to 15 hours in order to develop the required acidity.

442,101. GROUP XVIII. **Bags.** MILLS, S. C., Studley, Elgin Road, Weybridge, Surrey; GARE, E., Kibubuti Estate, Kyambu, P.O., Kenya Colony, East Africa.
An appliance suitable for use in the drying of coffee beans and other vegetable matter, alternatively as a bag or tray,

FIG. 1.

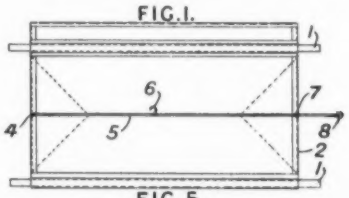
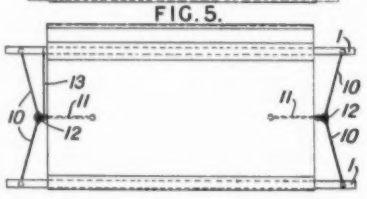



FIG. 5.

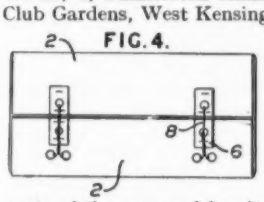



comprises a flexible sheet of material supported at its opposite edges as by rods, and means engaging the sheet adapted, when the supports are moved inwardly

from a position in which the sheet is flat, to fold the ends of the sheet inwardly in the form of substantially triangular flaps, thereby imparting a bagged form to the sheet. In the construction shown in Fig. 1 a stretcher comprising fabric 2 such as cotton cloth or jute hessian, secured to poles 1, is provided with a cord 5 secured to an eyelet 4 in one edge of the cloth and passing through an eyelet 7. The cord has a ring 8 and a hook 6, which are inter-engaged prior to the lifting of the poles so that the tension on the cord causes the fabric to form a bag. The contents can be discharged by releasing the ring 8 from the hook 6 and tilting the stretcher. In a modification shown in Fig. 5 the poles and fabric are inter-connected by rods 10, 11 joined to rings 12. At one end of the fabric the rod 11 is connected to the ring by a cord 13 secured at one end to a pole 1.

442,498. GROUP XVIII. **Cases.** LEWIS, W. L., 2, Palmerston Mansions, Queen's Club Gardens, West Kensington, London.

FIG. 4.




A packing case for fruit, etc., is fastened by a piece of wire 8 which passes through adjacent parts of the case and has its ends twisted together. As shown, the fastening is applied to the end-closing flaps 2 of a collapsible case of tubular form, but it may also be applied to the lid of a rigid case, the wire passing through a flap on the lid and the side of the case. The case is made of corrugated strawboard lined on both faces, and the holes through which the wires pass are strengthened by plates 6 of cardboard, cloth, wood, iron, etc. The ends of the wires may be sealed with lead seals. Ventilation holes may be provided in the containers.

442,759. **Non-rancidifying baked cereal product.** KELLOGG CO., Corner Porter and Stiles Streets, Battle Creek, Michigan, U.S.A.

Rancidification of salt-flavoured baked cereal grains, soya beans, or the like is ascribed to decomposition of sodium chloride at the usual baking temperatures with formation of appreciable quantities of hydrochloric acid. The latter is assumed to encourage hydrolysis of the fats, thereby accelerating rancidification. Common salt is an indispensable flavouring in ready-to-eat cereal foods, and the specification claims products obtained by adding this agent to the cereal *at the conclusion* of the usual heating operations. According to an illustrative example, 200 lb. whole wheat are cooked with 5 gal. water in a rotary steam cooker, rolled while still in the hot, moist condition, and then partially dried to a moisture content of 8 per cent. At this stage the product is coated with 7 gal. flavouring solution containing 60 lb. sugar, but no salt. Drying is then continued, followed by toasting at 400° to 600° F. After cooling, the grains are sprayed with a solution of 3 lb. salt in 4½ quarts water and finally dried at a low temperature (140° to 200° F.) before packing. (Convention date, U.S.A., December 14, 1933.)

# LATEST TRADE MARKS

*This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).*

**BARLEY BISCUITS.** — 566,905. **Biscuits made from barley.** HUNTLEY AND PALMERS, LTD., King's Road, Reading, and 162, Fenchurch Street, London, E.C. 3. April 15. (Associated.)

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the letters "H.P." and the devices of biscuits.

## COCK OF THE NORTH

565,592. **Biscuits and shortbreads.** McVITIE AND PRICE, LTD., St. Andrews Biscuit Works, Gorgie Road, Edinburgh, and The Edinburgh Biscuit Works, Harlesden, London, N.W. 10. (By Consent.) May 6.

**CUBEILLAC.**—566,818. **Milk and preparations of milk for use as food or as ingredients in food.** DRIED MILK PRODUCTS, LTD., Dominion Buildings, 2, South Place, London, E.C. 2. May 6.

**FARMA.** — B 557,245. **A preparation of milk, butter, sugar, eggs, and vegetable oils, and a preparation of sugar, glucose, albumen, and gelatine, both for use in the bakery trade as fillings for confectionery.** THE FARMA CREAM PRODUCT CO., LTD., 23 to 25, Prince of Wales Crescent, London, N.W. 1. April 15. (By Consent.)

User claimed from November 30, 1924.

**FOUR PRINCES.** — 567,579. **Substances used as food or as ingredients in food.** HUBERT WATERS, 296, Bute Street, Cardiff. May 6. (Associated.)

**FOUR QUEENS.** — 567,580. **Substances used as food or as ingredients in food.** HUBERT WATERS, 296, Bute Street, Cardiff. May 6. (Associated.)

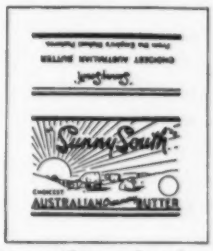
**HONEMAL.** — 559,445. **Biscuits containing honey.** HUBERT ARTHUR CARNELLEY THOMAS and ARTHUR PARSONS, trading as The Honemal Products Company, The Warehouse, Pottery Place, Llanelly. April 29.

**KILTIE.**—567,405. **Fish.** MAC FISHERIES, LTD., Unilever House, Blackfriars, London, E.C. 3. May 6. (Associated.)

**LOTUS.**—567,279. **Poultry, game, and rabbits, all for food.** A. S. JUNIPER AND CO., LTD., 369 to 370, Smithfield Markets, London, E.C. 1. May 6.

**NUTREGEN.** — 567,744. **Substances used as food or as ingredients in food.** ENERGEN FOODS CO., LTD., Energen Works, Bridge Road, Willesden, London, N.W. 19. May 6.

**SUNNY SOUTH.** — B 565,668. **Butter.** OVERSEAS FARMERS' CO-OPERATIVE FEDERATIONS, LTD., 4, Fenchurch Avenue, London, E.C. 3. April 22.




User claimed from November 1, 1933.

The applicants undertake to use the mark only on butter produced in Australia.

The applicants undertake that this mark, when registered, and the mark No. B 476,989 (2555) shall be assigned or transmitted only as a whole and not separately.

**"VITA" CUSTARD POWDER.**—565,010. ALFRED BIRD AND SONS, LTD., Devonshire Works, High Street, Deritend, Birmingham. March 4.

**WALTY.**—563,699. **Substances used as food or as ingredients in food.** SUPREME MANUFACTURING COMPANY, LTD., 58, Weaman Street, Birmingham, 4. April 1. (By Consent.)

**WHITE ROSE.** — 565,595. **Ducklings, chickens, and turkeys, all for food.** THORNBER BROTHERS, LTD., Square Works, Scout Road, Mytholmroyd, Yorkshire. March 4.

**YE OLDE OAK.**—566,092. **Bacon; and tinned briskets.** FRANK ROWLAND SMITH and ROBERT ROWLAND SMITH, trading as Rowland Smith and Son, 7 and 8, New Hibernia Chambers, London Bridge, London, S.E. 1. April 1. (Associated.)

**ZAVEE.** — 565,547. **Substances used as food or as ingredients in food.** F. W. HAMPSHIRE AND CO., LTD., Sunnydale Works, Sinfin Lane, Derby. February 12. (Associated.)

564,106. **Beverages (not alcoholic, not aerated, and not medicated), made from ginger, from oranges, from raisins, and from black currants; and lemon and barley water (not alcoholic, not aerated, and not medicated).**

SWAN BEVERAGES, LTD., 274, Queen's Road, Battersea Park, London, S.W. 8. March 18. (Associated.) (By Consent.)

# NEW COMPANIES

**Albion Confectionery Works, Limited.** 29, Bradshawgate, Leigh. To take over the bus. of the Albion Confectionery Works, etc. Nom. Cap.: £1,000. Permt. dirs.: W. Clark, Farringdon House, St. Helen's Road, Leigh; A. Ramsdale, Vicarage Square, Leigh.

**Arkina Company, Limited.** To carry on the bus. of mnfrs. and distributors of aerated, mineral, and artificial waters, etc. Subs.: G. H. Davis, 17, Shaftesbury Avenue, W. 1 (clk.); H. Gold, 1, Kenneth Crescent, Willesden, N.W. 2.

**British Confections (Sunderland), Limited.** To carry on the bus. of mnfrs. of and dlrs. in confectionery, etc. Nom. Cap.: £100. Permt. mng. dir.: R. L. Bryson, 9, Cambourne Avenue, Sunderland. Subscriber: Mrs. C. Bryson, 9, Cambourne Avenue, Sunderland.

**Cairo Products, Limited.** 6, Broad Street Place, E.C. 2. To carry on the bus. of mnfrs. of and dlrs. in coffee and other essences, jams, etc. Nom. Cap.: £1,000 in £1 shares (750 pref. ord. and 250 ord.). Dirs.: A. Hirajee Doctor, 11, Pepys Street, S.E. 16; A. R. New, Birchdale, Portsmouth Road, Thames Ditton; R. F. Arnatt, 37, Earl's Court Square, S.W. 5. Qual. of dirs.: One ord. share. Remun. of dirs.: As voted by the company.

**Herbert Cawdron and Son, Limited.** To carry on the bus. of mnfrs. of and dlrs. in wines, beers, etc. Nom. Cap.: £10,000. Dirs.: H. Cawdron, The Meadow House, Fakenham, Norfolk (permt. mang. dir.); G. R. Bunn, The Butlands, Wells, Norfolk.

**W. Conway, Limited.** To carry on the bus. of bottlers and storers of ale, stout, etc. Nom. Cap.: £10,000. Permt. mang. dir.: W. Conway, Linthorpe House, Old Clee, Cleethorpes. Sub.: A. F. Alsop, 17, Robson Road, Cleethorpes.

**Cottrill and Son (Ramsbottom), Limited.** 40, Bridge Street, Ramsbottom, Lancs. To take over the bus. of bacon curers, etc., cd. on at Ramsbottom as "Cottrill and Son". Nom. Cap.: £5,000 in £1 shares. Permt. dirs.: C. R. Metcalfe and Mrs. A. A. Metcalfe, 49, Bradford Street, Bolton; H. Metcalfe, 3, Mayfield Road, Holcombe Brook, Ramsbottom; N. D. Metcalfe, 215, Dundee Lane, Ramsbottom. Qualification of permt. dirs.: £100 shares.

**Fairmile Food Products, Limited.** Fairmile Factory, Fairmile Road, Christchurch, Hants. To carry on the bus. of mnfrs., packers, canners, and bottlers of foodstuffs, etc. Nom. Cap.: £200. Dirs.: J. S. M. Bain, Ashley Manor, New Milton, Hants; H. H. Oxley, Eglesdene, Station Road, Christchurch; F. Purves, 18, Carlton Crescent, Southampton.

**Essex Flour and Grain Company, Limited.** To carry on the bus. of millers, flour shippers, etc. Nom. Cap.: £5,000. Dirs.: To be appointed by the company or subs. Subs.: H. C. Spinks, 29, Lenzie Road, Hornsey, N. 8; J. H. Gadsden, Cross Keys House, 56, Moorgate, E.C. 2.

**Gloucester Flour Company, Limited.** To carry on the bus. of mnfrs. and sellers of flour, yeast, etc. Nom. Cap.: £2,000. Dirs.: F. W. Evans, Commelines, Upton St. Leonards; E. Baker, Glaschorrie, Barnwood Road, Gloucester.

**Ices (Blackpool), Limited.** 16, Mill Street, Oswaldtwistle, Lancs. To carry on the bus. of producers and mnfrs. of and dlrs. in milk, cream, ice-cream, etc. Nom. Cap.: £100. Dirs.: To be appointed by the subs. Subs.: W. Walsh, 35, High Street, Oswaldtwistle; S. I. Grindrod, 3, Orchard Avenue, Blackpool.

**Importex, Limited.** 116, Fenchurch Street, E.C. 3. To carry on the bus. of mnfrs. of and dlrs. in sausage casings, etc. Nom. Cap.: £100. Dir.: R. Risner, 122, Sinclair Road, W. 14.

**Kriger's Confectionery Works, Limited.** To carry on the bus. of mnfg. confectioners, etc. Nom. Cap.: £100. Dirs.: To be appointed by the subs.: Subs.: E. A. Turner, 47, Woodvale Avenue, S.E. 25 (mng. clk.); J. M. Simpson, 46, Hafton Road, S.E. 6 (clk.).

**Liverpool Associates, Limited.** Copthall House, Copthall Avenue, E.C. 2. To acquire a licence from Procea Products, Ltd., to manufacture starch, gluten, and other substances, etc. Nom. Cap.: £3,600. Dirs.: Not named. Subs.: W. J. Bellingham, 45, Courtfield Gardens, S.W.; T. B. Allison, Linden Lea, Granville Road, Birkdale, Lancs.

**Maple and Sons (Harbledown), Limited.** To take over the bus. of bakers and confectioners, corn dlrs., coal mchts., etc., cd. on at Rough Common, Canterbury, as "Maple and Sons". Nom. Cap.: £3,000. Permt. dirs.: G. D. Maple, Nettlested, Rough Common, Canterbury; H. Maple, Dog and Bear Inn, Rough Common, Canterbury; F. J. Maple, Clophill, Rough Common, Canterbury.

**Modern Foodcraft, Limited.** To manufacture, buy, and sell health foods, preserves, cakes, etc. Nom. Cap.: £2,000. Dirs.: Mary G. Howell, 24, Hillcroft Crescent, Ealing, W. 5 (ch.); A. J. Hutchins and Mrs. E. M. M. Hutchins, 39, Argyle Road, West Ealing, W. 13; A. H. Hutchins, 94, Twyford Avenue, Acton, W. 3.

**New Made Food Suppliers, Limited.** To carry on the bus. of mnfrs. of and dlrs. in cocoa, chocolates, etc. Nom. cap.: £1,000 in £1 shares. Dirs.: Not named. Subs.: G. J. Harris, Ford Cottage, Clifton, York; E. E. Wells, 9, Muncastergate, York.

**G. Ponting and Sons, Limited.** To take over the bus. of grocers and provision mchts. cd. on at The Stores, Fountain Street, Mountain Ash, as "G. Ponting and Sons". Nom. Cap.: £1,000. Permt. dirs.: R. Ponting, 86, High Street, Mountain Ash; E. G. Ponting, Oakleigh, Llanvonno Road, Mountain Ash.

**Prosper Equipments, Limited.** 166, Piccadilly, W. 1. To carry on the bus. of mnfrs. and/or vendors of specialised equipment for cooking fish, potatoes, etc. Nom. Cap.: £22,500. Dirs.: S. E. Smith, O.B.E., F.S.A.A., Elm Trees, Thorpe Esplanade, Thorpe Bay; T. E. Perks, B.Sc., Pinehurst, Cokes Lane, Chalfont St. Giles; C. E. Ross, 98, Rossmore Court, Park Street, Regent's Park, N.W.; W. G. Ball 53, Solon Road, Brixton, S.W. 2; W. M. Morton, 6, Talbot Road, Carlisle.

**L. and C. H. Reeves, Limited.** To carry on the bus. of bottle mchts., etc. Nom. Cap.: £5,500. Dirs.: L. Reeves, 32, Doddington Grove, Kennington, S.E. 11, and C. H. Reeves, 30, Doddington Grove, Kennington, S.E. 11 (joint mng. dirs.).

**Robinson's Dairies, Limited.** 414, Alexandra Avenue, Rayners Lane, Middlesex. To carry on the bus. of dairymen, etc. Nom. Cap.: £5,000. Dir.: F. Robinson, address not stated. Qual. of F. Robinson: 1,000 shares; other dirs., one share. Subs.: C. H. Polley, 69, Vicarage Road, Chelmsford, Essex (clk.); K. L. Titmuss, 52, Cunningham Park, Harrow, Middlesex (clk.).

**Roland Corks (Great Britain), Limited.** 2, Broad Street Place, E.C. To acquire patents relating to closure caps for bottles, etc. Nom. Cap.: £1,000 in 5s. shares. Dirs.: To be appointed by the subs. Qual. of dirs. (except 1st dirs.): £250. Subs.: J. M. Lickfold (solr.); V. E. Stevens, 17, Bedford Row, W.C. 1; and five others.

**Roydon Mill, Limited.** Roydon Mill, Roydon, Essex. To acquire Roydon Mill, Roydon, Essex, and to carry on the bus. of millers, farmers, etc. Nom. Cap.: £1,000. Dirs.: E. M. Snawdon and Mrs. B. A. Snawdon, both Mill House, Roydon Mill, Roydon, Essex.

**South Wales Jam and Marmalade Company, Limited.** To carry on the bus. of mnfrs. of jam, etc. Nom. Cap.: £100. Dirs.: To be appointed by the company or subscribers. Qual. of dirs.: 25 shares. Subs.: S. C. Chivers, Fermoy, Pwll-melin Road, Llandaff; S. L. Chivers, 4, Victoria Avenue, Penarth.

**Southend Mineral Water Company, Limited.** The Chase, Bournemouth Park Road, Southend-on-Sea. To carry on the bus. of mnfrs. of and dlrs. in mineral and aerated waters, etc. Nom. Cap.: £3,000. Dirs.: A. D. Smith, 53, Arundel Road, Kingston Hill, Surrey; and W. G. Howell, Huntly, Arlington Road, Southchurch Boulevard, Southend-on-Sea.

**E. Spooner and Sons, Limited.** To carry on the bus. of mnfrs., aerators, and bottlers of and dlrs. in mineral and aerated waters, etc. Nom. Cap.: £2,000. Permt. dirs.: H. E. Spooner, Danybryn, Pwll Street, Landore, Swansea; N. T. Spooner, Sherwell, Pwll Street, Landore.

**Sunorchards, Limited.** To carry on the bus. of fruit growers at Addington Park, West Malling, Kent, and elsewhere. Nom. Cap.: £5,000. Dirs.: To be appointed by the subs.: Subs.: H. Simmonds, 133, Dashwood House, Old Broad Street, E.C.; A. O. Warren, 31, Bedford Row, W.C. 1 (solr.).

*The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.*